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Multidisciplinary scholars have argued the importance of nature in human health for the past several decades (Kellert & Wilson, 1993; Roszak, 1992), and numerous researchers have identified the positive effects of nature on human wellness (Brymer, Cuddihy, & Sharma-Brymer, 2010; Kuo, 2010). The profession of counseling is based on the philosophy of human wellness (Myers, 1992), although the current multidisciplinary wellness models (Myers & Sweeney, 2008) seem to overlook the wellness benefits of nature. As a way to begin the systematic exploration of nature in professional counseling, Reese and Myers (2012) developed the construct of EcoWellness and described the construct as the missing link in holistic wellness models in counseling. They recommended that the next step in exploring the construct included the development of an instrument operationalizing EcoWellness and its underlying constructs. Thus, the purpose of this study was to develop and assess the initial validity and reliability of the Reese EcoWellness Inventory (REI).

The researcher utilized a six-step instrument development method that included the pilot testing of an initial 111-item instrument with a convenience sample of college students (N = 264). After modification of the REI, a revised 62-item instrument was tested and evaluated with a simple random sample recruited from Researchmatch.org (N = 853). Participants completed the REI, the Five-Factor Wellness Inventory (Myers & Sweeney, 2005b), and the Marlowe-Crowne Social Desirability Scale Short Form (Strahan & Gerbasi, 1972) in testing the initial validity and reliability of the REI. Results

of confirmatory and exploratory factor analyses and the associated univariate tests demonstrated a mixed picture of the instrument's validity and reliability. A lower-level factor model was tested and it was found to possess adequate model fit. It was determined that the second-order factor of EcoWellness dictated the relationships between the lower-level factors. The development and testing of the REI provides an initial empirical foundation for the integration of nature into professional counseling and counselor education. Further research is needed to replicate and extend the study findings through utilizing samples more inclusive of national distributions of demographic characteristics such as age, gender, and ethnicity.

ECOWELLNESS: CONSTRUCTION & VALIDATION OF THE REESE ECOWELLNESS INVENTORY

by

Ryan F. Reese

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Approved by

_____
Committee Chair

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To connection, wisdom, and harmony

and

to rediscovering the natural.

APPROVAL PAGE

This dissertation written by Ryan F. Reese has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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Traversing the dissertation has been similar to paddling down a river that is new to the adventurer. There have been expected and unanticipated twists and turns, times of clarity and turbidity, instances of great excitement and discovery, and occurrences of connection and disconnection. I like to think that I have made it most of the way down the river, although my journey has already continued on yet another river before leaving this one. That process has been both exciting and scary. I feel like I have had to carve my own path in a number of ways, which has contributed to a greater confidence in myself and solidified the love and support of those who are clearly invested in my process, both as an individual and as a professional.

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CHAPTER I

INTRODUCTION

In the past several decades multidisciplinary scholars and researchers have argued the importance of nature in human health (Kellert & Wilson, 1993; Roszak, 1992). With increased technology, children and their families are spending less time outdoors and more time engaged in activities indoors (Clements, 2004). This trend has been associated with increases in obesity, a host of behavioral problems in children, and impairments in mental and physical health (Robinson, 1999). Numerous researchers have identified the positive effects of nature on human wellness. (Brymer, Cuddihy, & Sharma-Brymer, 2010; Guite, Clark, & Ackrill, 2006; Kuo, 2010; Weinstein, Przybylski, & Ryan, 2009). Wellness benefits supported through research include alleviating stress symptoms, enhancing focus and concentration in children, improving mood, and positively impacting human relations (Hartig, Mang, & Evans, 1991; R. Kaplan & Kaplan, 1989; Taylor, Kuo, & Sullivan, 2001; N. M. Wilson, Ross, Lafferty, & Jones, 2008; Weinstein et al., 2009). These findings have been grounded in a variety of nature theories, including ecopsychology (Roszak, 1992), biophilia (E. O. Wilson, 1984), attention restoration theory (ART; R. Kaplan & Kaplan, 1989), stress reduction theory (Ulrich, 1983), and place attachment (Ramkissoon, Weiler, & Smith 2012). Despite the multidisciplinary research evidence, few scholars within professional counseling have explored the impacts of nature on human wellness.

Wellness models in counseling (Myers & Sweeney, 2008) were developed to assist practitioners and researchers in meeting and studying the holistic needs of clients. However, such models have yet to clearly include nature's effects on wellness in their definition. Without the deliberate consideration of nature's effects on wellness, counselors may fail to incorporate nature in work with clients, missing an important way to enhance holistic functioning.

To address this gap in the holistic wellness literature in counseling, Reese and Myers (2012) introduced EcoWellness as an omitted and necessary construct in wellness models. These authors argued that EcoWellness might assist practitioners and researchers in making sense of the wellness effects of assessing and incorporating nature in counseling. They proposed three dimensions of the construct based in a review of the literature, which included access, environmental identity, and transcendence. Reese and Myers suggested that the next step in the study of EcoWellness in counseling is the development of an instrument operationalizing the underlying constructs. To date, such an instrument has not been generated.

In this chapter, an overview of nature theory, clinical applications, nature assessment, and wellness models is provided. A statement of the problem in regard to the integration of nature into current counseling practice and research is postulated. EcoWellness is introduced as a potentially powerful construct that can be integrated in professional counseling. The purpose of the study and research questions is described. The significance of the study, definition of key terms, and the study organization concludes the chapter.

Nature

Nature has been described in a variety of ways spanning multiple disciplines (Beringer, 2004; Brymer et al., 2010; Cookson, 2011; Louv, 2012; Maller, Townsend, Pryor, Brown, & St Leger, 2006). Nature has often been articulated as a way to distinguish humankind from other living organisms. Terms such as wilderness have been defined in ways that provide a sense that humans are distinctly separate from nature and that it somehow exists somewhere far away from where humans reside (Public Law 88-577, 1964). In contrast, other scholars have suggested that any living or organic element composes nature (Maller et al., 2006) while other theorists have suggested that the conception of nature depends on the quality of interaction between the human and non-human organism or setting (Cookson, 2011). These differing perspectives on nature have given rise to a variety of theoretical models, where thinkers have attempted to explain the meaning of nature and the human nature bond (R. Kaplan & Kaplan, 1989; Proshansky, 1978; Roszak, 1992; E. O. Wilson, 1984). Such theories have also been the basis for a variety of clinical applications and prompted the development of several psychometric instruments purported to measure the human-nature connection (Mayer & Frantz, 2004; Nisbet Zelenski, & Murphy, 2009).

Ecopsychology (Roszak, 1992) and biophilia (E. O. Wilson, 1984) theory have risen as the focal point of nature theories, attracting mainstream culture for their focus on environmental sustainability. In both theories humans are viewed as having either an inherent unconscious or genetically based reliance on nature for survival. The underlying tenets of either theory assume that when one is lacking connection with nature, mental

and physical impairment occur. It is within the scope of both theories that humans are challenged to view themselves as a part of nature in an attempt to promote greater care for the environment and themselves (Kellert, 1993; Roszak, 1992). Some research has shown evidence for inherent connections. Mayer and Frantz (2004) connected an "environmentalist" identity directly with nature connectedness and a measure of well-being. Ecologically sustainable behaviors (i.e., recycling) have been associated with higher levels of self-reported wellness (Jacob, Jovic, & Brinkerhoff, 2009). A. J. Howell, Dopko, Passmore, and Buro (2011) predicted psychological health from one's connection with nature. Despite some empirical evidence, both theories have been criticized for their lack of falsifiability, preventing researchers from directly testing the tenets of the theories (Hibbard, 2003; Joye & De Block, 2011).

Three additional nature theories were developed to describe more specifically *how* humans benefit from interacting with nature. Place attachment (Ramkissoon et al., 2012) has been described as impacting one's ability to experience wellness from one's connection with place. It has been posited as having emotional, functional, social, and identity dimensions (Ramkissoon et al.). Attention restoration theory (R. Kaplan & Kaplan, 1989) scholars suggest that nature impacts the restoration of cognitive fatigue through effortless fascination. Major aspects of the theory include having a sense of being away from one's typical setting, being fascinated by one's environmental context, possessing a sense of relatedness to and the ability to explore one's environment, and the having a level of compatibility with the environment (R. Kaplan & Kaplan). Finally, Ulrich et al. (1991) argued that stress (and emotions) could be restored through activation

of the parasympathetic nervous system in the presence of nature. These theories have accumulated an abundance of research support in the past several decades, which will be reported and critiqued in Chapter II. However, the testing of the specific tenets of nature theory under the context of applied research has been limited.

The application of nature theories and research are found within several ecotherapies. Animal-assisted therapy (Chandler, 2005), horticultural therapy (Horowitz, 2012), adventure-based and wilderness therapies (Hill, 2007), and other general ecotherapies such as going for walks in nature or building forts (N. M. Wilson et al., 2008) have all been developed. Such therapies have been associated with decreases in recidivism (Hill, 2007), reductions in anxiety (Verra et al., 2012), depression (Gonzalez, Hartig, Patil, & Martinsen, 2011), and increases in self-reported self-efficacy (Pederson, Nordaunet, Martinsen, Berget, & Braastad, 2011). Some proponents of the ecotherapies have utilized ecopsychology, biophilia, and attention restoration theory to contextualize findings related to improvements in mental health, but results have been described only in general support of the theories and not in relation to specific components (Gonzalez et al., 2011; Gonzalez, Hartig, Patil, Martinsen, & Kirkevold, 2010; O'Haire, 2010). Thus, whereas the ecotherapies appear at least somewhat effective in promoting mental health, it remains uncertain how and why nature-based interventions are effective; assessment linking nature theory and practice are lacking.

A broad variety of instruments assessing the human-nature connection have been developed in testing and applying nature theory. For example, assessments such as the Nature Relatedness Scale (Nisbet et al., 2009), the Connectedness to Nature Scale (Mayer

& Frantz, 2004), the Perceived Restoration Scale (Hartig, Korpela, Evans, & Garling, 1997), and a five-factor place attachment scale (Raymond, Brown, & Weber, 2010) have all emerged to describe how and why people connect with nature. Although these assessments have possessed relatively acceptable validity and reliability, the developers of these models did not intend for them to be utilized for the purposes of assessing wellness in research or clinical settings. Thus, they lack the infusion of holistic wellness, making it difficult to assess the wellness one experiences from her or his connection with nature in research or clinical practice.

Wellness

Beginning in the 1950's, a number of authors in the health professions began writing extensively about and expanding various conceptualizations of wellness (Ardell, 1977; H. Dunn, 1961; Hettler, 1984; Travis, 1972). However, relatively few academicians and practitioners in professional counseling have written about the integration of nature into counseling (Glass & Myers, 2001; Reese & Myers, 2012; Sackett, 2010). Similar to nature, the construct of wellness has many distinct yet similar definitions. Hettler (1980) conjectured wellness as the combination of physical, emotional, occupational, spiritual, intellectual, and social health. H. Dunn defined high level wellness as a lifestyle that maximized human potential. Ardell (1984) built upon H. Dunn's concept of wellness insofar as he believed people could choose to create a lifestyle involving a personalized strategy of wellness. Wellness in professional counseling is built upon these earlier conceptualizations, suggesting that wellness includes a lifestyle that embodies holistic living through the integration of all aspects of

health, (i.e., body, mind and spirit) to help the individual lead an optimal life (Myers, Sweeney, and Witmer, 2000).

Two models of wellness have been developed in professional counseling, one theoretical (Sweeney & Witmer, 1991) and one evidence-based (Myers & Sweeney, 2008). The Wheel of Wellness includes 17 components of health, with spirituality lying at the center. The model spans outward in the shape of a wheel, suggesting that if anything goes amiss in one part of the wheel all other parts are also affected. Through structural equation modeling, an evidence-based model of wellness was developed (Myers & Sweeney, 2008). The original 17 components of the Wheel of Wellness appear as third-order factors within the Indivisible Self model of wellness (Myers & Sweeney, 2004). The Indivisible Self model of wellness is operationalized through the Five-Factor Wellness Inventory (Myers & Sweeney, 2005a), which includes a higher order factor of Wellness, five second-order factors, and the 17 third-order factors.

The IS-Wel model also includes contextual variables such s local, institutional, global, and chronometrical variables, although they have not been empirically validated. The Five-Factor Wellness Inventory has been utilized in studying the wellness of children and adolescents (Myers, Willse, & Villalba, 2011), undergraduate students (Myers & Mobley, 2004), counselors, counselor educators, and counselors in training (Hartwig Moorhead, Gill, Barrio Minton, & Myers, 2012), and used as an outcome measure in program assessment (Villalba & Myers, 2008). Overall, however, there is a lack of literature linking nature and holistic wellness models and outcomes. To address this gap, Reese and Myers (2012) introduced the construct of EcoWellness.

EcoWellness

Reese and Myers (2012) proposed EcoWellness as the missing link in wellness models in counseling. The construct was grounded in nature theory and the associated research. They hypothesized that the construct included the dimensions of access, environmental identity, and transcendence, all of which were embedded in a review of the literature. The original delineation of EcoWellness also included the sub-dimensions of community connectedness and spirituality in the dimension of transcendence. As a result of a thorough review of the literature in Chapter II, access is further broken down into physical access and sensory access, and environmental identity is broken down into connection, protection, and preservation. Reese and Myers (2012) suggested that a next step in the study of nature and wellness in counseling might be the development of a valid and reliable measure of EcoWellness. However, to date, such an assessment has not been constructed.

A review of the literature suggests the existence of clear relationships between facets of wellness and nature. Nonetheless, wellness models and the associated research have not been inclusive of nature. EcoWellness was developed to fill this gap in the literature and begin exploration of the relationships between nature and wellness. To date, a variety of assessments have been developed in several disciplines to explore human-nature connections, but none are inclusive of the wellness construct. The lack of a valid and reliable instrument that assesses relationships between nature and wellness poses several problems in the study and application of nature in counseling.

Statement of the Problem

A growing body of empirical evidence has shown that nature is critical in fostering healthy relationships with others (Kuo & Sullivan, 2001b; Weinstein et al., 2009), maintaining positive mood states and decreasing stress (Park, Tsunetsugu, Kasetani, Kagawa, & Miyazaki, 2010; Ulrich et al., 1991), promoting physical health (Pretty, Peacock, Sellens, & Griffin, 2005; Ulrich, 1984), and increasing focus and concentration (Faber Taylor & Kuo, 2011; Raanaas, Evensen, Rich, Sjøstrøm, & Patil, 2011). Despite the breadth of research evidence, interdisciplinary wellness models have yet to explicitly include nature's effects on wellness (Myers & Sweeney, 2008). To address this gap, EcoWellness has been proposed as the missing link in wellness models and a potentially useful construct to assist counselors in making sense of the wellness effects of assessing and incorporating nature in counseling (Reese & Myers, 2012).

The integration of the EcoWellness construct into wellness models and clinical practice requires empirical investigation into its core tenets. Reese and Myers (2012) suggested that in order to begin the study of EcoWellness, the development of a reliable and valid measure is necessary. Although researchers have operationalized a variety of closely related constructs in the form of assessments (Chavis, Lee, & Acosta, 2008; Howden, 1992; Largo-Wight, Chen, Dodd, & Weiler, 2011b; Nisbet et al., 2009) none have been uniquely created to assess EcoWellness. A valid and reliable EcoWellness assessment will further the exploration of nature in wellness models and in counseling. Therefore, the purpose of the study is to develop and validate a measure of EcoWellness.

Purpose of the Study

The development of EcoWellness provides counselors with a potentially powerful area of study and practice as the construct has been grounded in the research-based findings between nature and wellness to date. However, little is known empirically about the construct. The purpose of this study is to develop and test the Reese EcoWellness Inventory, assess the validity and reliability of the initial instrument, and refine both the definitions and assessment of EcoWellness for use in counseling.

Research Questions

The overarching question of the study is the following: Is the Reese EcoWellness Inventory (REI), including its subscales (e.g., access, environmental identity, and transcendence), valid and reliable? This larger guiding question is broken down into seven research questions.

Research Question 1: Does the REI possess construct validity?

Research Question 2: Does a general EcoWellness factor exist that describes the associations among the lower order factors?

Research Question 3: Does the REI scale and its subscales possess high internal consistency reliability?

Research Question 4: Do the subscales of the REI display distinct traits?

Research Question 5: Does the REI and its subscales account for a significant proportion of variance in overall wellness?

Research Question 6: Is the REI susceptible to socially desirable responding?

Furthermore, as this is a new area of scientific inquiry, an additional non-directional exploratory research question is included.

Research Question 7: Will demographic factors account for a significant proportion of variance in REI and its subscales?

Significance of the Study

Given the overwhelming research evidence showing that nature promotes aspects of wellness in humans, it is imperative that researchers and practitioners in professional counseling begin considering how the integration of nature into counseling assessment and practice might be used to promote holistic wellness. A lack of literature about nature in counseling suggests that professionals could potentially be missing an important component to overall wellness when working with clients.

Given this state of affairs, the development and study of an EcoWellness instrument is significant for several reasons. The creation of a valid and reliable instrument may provide practitioners and researchers with a method through which they can systematically assess the effects of nature on human holistic wellness in counseling. Currently, evidence-based interventions integrating nature into traditional counseling settings are lacking. Therefore, a valid and reliable assessment of EcoWellness may provide professional counselors with direction in integrating nature into therapeutic processes. Such an assessment also will assist researchers in further exploring nature's impacts on wellness in counseling. Lastly, a valid and reliable measure might further be used to screen potential clients for the appropriateness of specific outdoor or nature-based interventions (i.e., wilderness therapy interventions) and identify which areas of one's

connection with nature an individual can strengthen with a helping professional to promote optimal living. Thus, the development of an EcoWellness measure may not only fill a gap in the wellness literature in counseling, it might spark innovative and evidence-based research and practice designed to incorporate nature into counseling assessment and practice.

Definition of Terms

It is proposed that important associations exist between the variables of nature and wellness. The researcher seeks to empirically validate these relationships through the development of an EcoWellness instrument. The constructs in this study hold different and diverse meanings depending on discipline and context. To clarify what the terms mean in this study, nature, wellness, EcoWellness, and its proposed dimensions are defined.

Nature

For the purposes of this study, nature is an individual's purposeful, direct or indirect, engagement with other living systems and non-human species (e.g., public parks, national forest, personal and community gardens, or domesticated and undomesticated animals). Such interactions are culturally bound and assumed to be contingent upon the values and lived experiences of the individual.

Wellness

Wellness is defined in this study from a professional counseling perspective, in which Myers et al. (2000) suggested that wellness is

> a way of life oriented toward optimal health and well-being, in which body, mind, and spirit are integrated by the individual to live life more fully within the human and natural community. Ideally, it is the optimum state of health and well-being that each individual is capable of achieving. (p. 252)

Myers et al.'s definition of wellness incorporates the integration of known health factors and the notion that if just one facet of human health is negatively or positively influenced, so too are the other aspects of the individual.

EcoWellness

EcoWellness is "a sense of appreciation, respect for, and awe of nature that results in feelings of connectedness with the natural environment and the enhancement of holistic wellness" (Reese & Myers, 2012, p. 400). The construct was proposed as having three dimensions: access, environmental identity, and transcendence.

Access. The dimension of access is the ability to physically be in nature and explore nature with one's senses. *Physical access* is living, working, socializing, or recreating in (or with) places and species that the individual considers nature. It is also having the potential to access nature whenever one pleases. *Sensory access* is being able to touch, smell, see, or hear nature, even in the absence of physical nature.

Environmental identity. Environmental identity is the extent to which the individual incorporates nature into his or her self-concept and lifestyle (Reese & Myers, 2012). Close inspection of the interdisciplinary research and theory suggests that environmental identity includes the sub-dimensions of connection, protection, and preservation. *Connection* is the experience of pleasant cognitions (including memories) and positive emotions when reflecting on one's relationship with nature and partaking in

experiences in or with nature. This sub-dimension includes having a special place (or places) in nature that elicit positive emotions. Connection also includes the active use of nature as a method for recreation. *Protection* is incorporating elements of nature into one's lifestyle that can be of benefit to one's survival and taking precaution(s) when in the presence of species or natural elements that can bring harm to the individual. *Preservation* is taking action(s) related to an environmental cause (e.g., recycling).

Transcendence. Transcendence is the ability to connect with entities outside the self when accessing nature and expanding awareness about one's role or sense of purpose relative to the human and non-human community (Reese & Myers, 2012). It has two proposed components. *Spirituality* is the perceived connection with one's conception of a higher power and/or one's life-guiding beliefs when in the presence of nature. It is the ability to find inner peace when exposed to nature and also elicits the perception of seclusion or being away from one's typical environment. *Community connectedness* is "the propensity for individuals to consider the needs of other living things as much as one's own needs when exposed to natural environments" (Reese & Myers, 2012, p. 403). It is marked by compassionate and generous acts toward others when exposed to nature. In addition, community connectedness is associated with a greater sense of interconnectedness with the human and non-human community through contact with nature.

Study Organization

This study is presented in five chapters. Included in Chapter I were the study rationale, statement of the problem, significance, and purpose of the study. Key

constructs, definitions, and research questions were also presented. Chapter II includes a review and critique of definitions of nature, nature theory and the associated research and assessment, the nature therapies, and the multidisciplinary and specific wellness models in professional counseling. The chapter ends with an examination of the constructs, research, and theory underlying EcoWellness and the current practices of EcoWellness assessment are elucidated. In Chapter III, the study methodology is explicated, including research questions, hypotheses, study design, pilot testing, and data analyses. Chapter IV includes the results of the field study, in which relevant data analyses specifically addressing the research questions are reported. The study concludes with a discussion of the results in Chapter V, including study limitations and implications for counselor education, counseling practice, and research.

CHAPTER II

REVIEW OF THE LITERATURE

An abundance of research in multiple disciplines other than professional counseling has highlighted the positive impacts natural environments have on human holistic wellness (Brymer et al., 2010; Guite et al., 2006; Kuo, 2010; Weinstein et al., 2009). Among the wellness benefits empirically supported through research are reductions in symptoms of stress, decreases in attention deficit-hyperactivity disorder (ADHD) symptomology, reductions in symptoms of mood disorders, decreased recovery time from surgeries, and the restoration of concentration (Hartig et al., 1991; R. Kaplan & Kaplan, 1989; Taylor et al., 2001; N. M. Wilson et al., 2008; Ulrich, 1984).

Despite the breadth of research evidence, across professions wellness models have yet to explicitly include nature's effects on wellness (Myers & Sweeney, 2008). Without the overt consideration of nature's effects on wellness, counselors and researchers interested in the integration of nature into counseling processes may struggle to explain changes in human holistic wellness as a result of incorporating nature in counseling. Thus, helping professionals could potentially be missing an important component to overall wellness when assessing the holistic wellness of clients. To enhance wellness models in counseling, EcoWellness has been proposed as the missing link in wellness models and a potentially useful construct to assist practitioners and

researchers in making sense of the wellness effects of assessing and incorporating nature in counseling (Reese & Myers, 2012).

In this chapter, theories about nature are explored and associated research is described and critiqued. Wellness models of counseling and health education are examined and the research associated with each is presented. The EcoWellness construct, the citation and evaluation of the research underlying its proposed structure, and the need for the development of an EcoWellness instrument is highlighted. The chapter concludes with a summary of the literature reviewed, identification of gaps in our understanding of the relationship between nature and wellness, and a discussion of the need for further study of EcoWellness.

Nature, Theory, Research, and Applications

The construct of nature has been defined in a variety of ways in literature crossing multiple disciplines (Beringer, 2004; Brymer et al., 2010; Cookson, 2011; Louv, 2012; Maller et al., 2006). These definitions have influenced a variety of theoretical models that explain the meaning of nature and the human nature bond (R. Kaplan & Kaplan, 1989; Proshansky, 1978; Roszak, 1992; E. O. Wilson, 1984), have resulted in the creation of several assessment instruments to measure the nature construct (Mayer & Frantz, 2004; Nisbet et al., 2009), and have been the basis for a variety of clinical applications. In this section, definitions of nature are examined, theories of nature are presented and associated research and assessments are explored. The applications of nature theory to counseling and therapeutic outcomes, an important extension of nature research for counselors, are examined as a foundation for exploring wellness and wellness counseling.

What is 'Nature'?

A comprehensive review of literature about "nature" leads to the conclusion that there is not one commonly accepted definition of nature within academic and non-academic settings and yet, for many people, vivid images come to mind when one hears the term. The lack of a common definition of nature makes the evaluation and application of theories challenging, and inhibits a unified approach to understanding the wellness benefits of nature in counseling. In this section, nature is defined from both historical perspectives and from current literature across disciplines. The varied definitions take on additional dynamics when considered in the context of theories of nature presented in the next section.

Historical perspectives of nature. Literally meaning "birth" ("Nature," 2012a), the word nature is derived from the Latin word, *Natura*, or "essential qualities, innate disposition." *Natura* was the Latin translation of the Greek word *Physis*, originally connected to and described as the innate characteristics of plants, animals, and other aspects of the world that develop through solidarity (Naddaf, 2005). The original use of the word *Physis* was to describe "human nature," including an inherent urge to dominate or give way to impulse (Naddaf, 2005). Centuries later, with nearly 20 definitions published in the dictionary ("Nature," 2012b), nature remains a difficult construct to describe in the context of every day conversation let alone scholarly research.

In regard to non-human species, nature has been defined as "all natural phenomena and plant and animal life, as distinct from man (*sic*) and his creations" or "a wild primitive state untouched by man or civilization" ("Nature," 2012b). Under the

context of research developed to describe the wellness benefits of the non-human world, some although few scholars have also used the term “non-human nature” to acknowledge that human beings are, in fact, natural (Brymer et al., 2010). Interestingly, this non-human nature has not been defined.

In her discussion of outdoor adventure-based programming, Beringer (2004) argued that perceptions of nature, which are often understood as being “out there” somewhere far off in the wilderness, result in subjective interpretations of what nature is. An infinite number of interpretations result from viewing just one image (i.e., a picture of a forest). Thus, Beringer provided a broad definition of nature as a

> common sense interpretation of nature as the natural world or worlds; as the green environment or environments; as the biophysical, material environment. This can take the form of pristine environments (wilderness), semi-natural (e.g., parks), and human-altered environments (urban, artificial, constructed environments). As such, nature includes the spectrum from wilderness to cultural landscapes. (p. 55)

Beringer’s (2004) broad definition implies nature as including varying levels of wildness. Wildness was often discussed by Thoreau (1906) and more recently defined by Cookson (2011) as the “quality of interactive processing between an organism and nature where the realities of base natures are met, allowing the construction of durable systems” (p. 188). Described as an actual process as opposed to a place or thing, the quality of interactive processes within wildness depends on the individual’s internal and external arenas of organization. The internal arena “draws upon base natures, instincts, and desires” (p. 188); meaning, one is able to do in nature (or can attempt to do) whatever he or she wishes or desires. The external arena includes the quality of surroundings that one

might find inspirational or awe-inspiring. The greater one's desire to engage in nature, and the better the "quality" of nature, the higher the wildness of an interaction.

Wildness (which to date has not been empirically evaluated) is distinguished from the term wilderness. Often used synonymously with nature, writers of the Wilderness Act of 1964, stated that wilderness is "recognized as an area where the earth and its community of life are untrammeled by man (*sic*), where man (*sic*) himself is a visitor who does not remain" (Public Law 88-577, 1964, p. 891). In other words, wilderness is a kind of nature where humankind might visit, but they do not stay or live permanently. Nature, non-human nature, wilderness, and other similar terms have taken on different meanings throughout the construct's history. Recently, several other conceptions of nature have been developed within the multidisciplinary literature.

Multidisciplinary conceptions of nature. Other scholars have developed general definitions of nature that are not as precise as those just described. Maller et al. (2006) provided an alternate definition of nature based on a review of the literature on the public health benefits of parks in urban settings, as "an organic environment where the majority of ecosystem processes are present (e.g., birth, death, reproduction, relationships between species)" (p. 46). They described nature as including domesticated or undomesticated animals, farms or gardens, or any single element of nature, such as soil or a plant in a pot. Nature also included the biochemical and natural processes that led to the earth's current physical state. Nature, then, is an expansive construct that can include nearly any living thing or set(s) of living things. To date, neither these authors nor others have included this conceptualization of nature in empirical investigations.

The western journalist Richard Louv (2012) conceptualized nature in the following way: “Human beings exist in nature anywhere they experience meaningful kinship with other species” (p. 52). From this perspective, nature can be found anywhere, whether it be in the city, in the home, or in the “wilderness.” Louv’s observation that nature can be found and occur anyplace attests to the complexity of the nature construct. Although his definition has not been directly implemented into the study of nature, researchers have included similar conceptualizations in their studies.

Broad conceptualizations of nature have prompted researchers to develop innovative uses of technology in further assessing the intricate connections that humans share with nature. For example, Kahn (2011) observed that nature can be experienced through various media, such as plasma screen televisions or a robotic dog. He termed this phenomenon “technological nature.” Support for this view of nature was provided by Kahn et al. (2008), who found that viewing images of a green setting (i.e., view of a garden, fountain, lawn space) on a plasma screen decreased stress more so than staring at a blank wall. However, these scholars also found that technological nature was less effective in reducing stress when compared with viewing a natural setting (i.e., view of a garden, fountain, lawn space) through a window. The researchers concluded that “real” nature was more beneficial at reducing stress but that technological nature could still be beneficial to human wellness. With the added dimension of technology being layered onto conceptions of nature, the term continues to be a diverse and elusive construct to define. An integration of the definitions may provide direction for a common definition.

An integrated definition of nature. In summary, the word nature and related constructs have been described in a variety of ways. In many of the existing definitions nature is viewed as comprising an entity distinctly separate from anything related to humankind, thus resulting in an image of a mostly "untouched" forest or undiscovered island, not visibly impacted by humankind. In other definitions, nature is not dichotomized but viewed as inseparable from humans, who are a part of nature. Moving towards a common definition of nature that merges the two perspectives will assist researchers in the study and theoretical development of nature. From the literature cited, what most definitions seem to have in common is that nature are the following characteristics: human interaction or exposure (Louv, 2012) with non-human species or organic environments (Maller et al., 2006), ranging in their levels of wildness (Cookson, 2011), in settings that include wilderness, public parks, and urban environments with artificial landscapes such as a garden or technological nature (Beringer, 2004; Kahn, 2011). This definition will be used as the central meaning of nature throughout this chapter, however, individual theories incorporate only parts of the definition an at times add other meanings with the theoretical context.

Theory and Research

A variety of conceptions of nature have just been explored to cover the depth of the construct as well as to provide a foundation on which theory and research can be examined. Similar to what has just been delineated, nature has been defined within the theories and research studies that follow through a lens that views humans as distinct from 'nature.' Ecopsychology (Roszak, 1992) and biophilia (E. O. Wilson, 1984) have

attracted attention across disciplines and within mainstream culture for their focus on sustainability and promoting a higher ethic for the natural environment. In both theories humans are challenged to view themselves as a part of nature in an attempt to promote greater care for the environment and themselves (Kellert, 1993; Roszak, 1992). Place attachment (Ramkissoon et al., 2012), attention restoration theory (R. Kaplan & Kaplan, 1989), and stress reduction theory (Ulrich et al., 1991) were developed to describe more specifically *how* humans benefit from interacting with natural environments. Each theory's definitions, key constructs, assessments, and research support are discussed while the varying definitions of nature are made clear.

Ecopsychology. Ecopsychology (Roszak, 1992) has received national media attention in recent years, as global climate change has become a paramount issue in the United States and throughout the world (Gore, 2006). Ecopsychology has also been linked to not only the world's wellbeing, but that of our species as well. This section includes a description of ecopsychology, the research posited to support the theory, assessments following from the theory, and links to wellness.

Definitions. Roszak (1992) coined the term ecopsychology to describe the effects of human-nature connections on human psychology and on the natural environment. He described the goal of ecopsychology as "awaken[ing] the inherent sense of environmental reciprocity that lies within the ecological unconscious . . . to heal the more fundamental alienation between the person and the natural environment" (p. 320). Roszak's conception of the ecological unconscious (also called the "id") was grounded in psychoanalytic theory, which posited that individuals possess an id (i.e., instinctual

drives), ego (i.e., accountability), and superego (i.e., the conscience; Freud, 1910). However, rather than limiting his explanation of the id in terms of instinctual drive to satisfy the pleasure principle (Freud, 1922), Roszak argued that the id helped select specific instincts and traits over the course of human evolution in aiding humans to adapt to their surroundings. He argued that the id, therefore, possesses inherent knowledge about nature and a spiritual or sacred sense with nature. Therefore, the goal of ecopsychology is to create an ecological ego through the interaction between the id (also the ecological unconscious) and ego. Several important constructs serve as the foundation of ecopsychology.

Key constructs. Roszak (1992) was sharply critical of modern science, arguing that it was reductionist in its study of "nature," and highlighted the importance of affectively engaging with natural settings. Roszak suggested that the dominant cultures are largely western European, thus ignoring societies that emphasize spirituality, holism, and connecting with the natural world. The roots of ecopsychology lie within transpersonal psychology, depth psychology, and deep ecology (Hoelterhoff, 2010). Naess (1973) described the core tenets of deep ecology as including the beliefs that the wellbeing of nonhuman life possesses value in and of itself and human beings should only tamper with or harm other life forms when satisfying important or elemental needs. Similarly, ecopsychologists believe that nonhuman life is the extension of the self and that when the world hurts, so do humans (Roszak).

Ecopsychology has additional ties to both transpersonal and depth psychology. Transpersonal psychology is "concerned with the study of humanity's highest potential,

and with the recognition, understanding, and realization of unitive, spiritual, and transcendent states of consciousness" (Lajoie & Shapiro, 1992, p. 79). In the 1960's and 70's many people began utilizing "peak experiences" to reach out beyond themselves to connect with others and the world beyond their immediate self. Abraham Maslow (1971) defined the term peak experiences believing such experiences could bring about deep feelings of interconnectedness and unity with all things. In many instances a connection with nature occurred through in vivo activities (i.e., hiking a mountain or viewing an ocean), which served as the stimuli for such euphoric experiences.

Depth psychologists have been described to include Jungian, psychoanalytic, and Adlerian perspectives (King & Shelley, 2008). Jung described the collective unconscious as being composed of archetypes that included such instincts as behavior, emotion, and imagery (Schroeder, 1992). These archetypes provide people with meaning that can be elicited from interpersonal interactions with others and the world around them through projecting archetypes onto other beings. When archetypes are projected onto natural environments, such projections are theorized to inspire deep feelings of connection with all living things, thereby transcending the self. The Adlerian perspective values the notion of community feeling and social interest (King & Shelley, 2008). Adler (1954) used the term *Gemeinschaftsgefuhl* (a feeling of community) to describe what a person needed in order to be well. In particular, Adler's approach to psychotherapy, which he termed Individual Psychology, actually refers to the Latin individuals, meaning "indivisible" and "inseparable" (King & Shelley). Though Adler did not make explicit reference to one's connection with nature, he did argue that one needed to be connected with the larger

community. Therefore, one's relationship with nature might serve as an extension of Adler's theory. Psychoanalytic theory includes a focus on the repression and the presence of unconscious forces including concepts such as sexuality, resistance, and transference (Freud, 1910). Freud's theory also included the division of the psyche, which encompassed the id (i.e., instinctual drives), ego (i.e., accountability), and superego (i.e., the conscience). The integration of the underlying constructs of ecopsychology makes for a complex and challenging theory to assess.

Assessment. To date, no research instruments have been developed to assess ecopsychology or its underlying constructs (i.e., the ecological unconscious). However, the Connectedness to Nature (CNS) scale, which was developed by Mayer and Frantz (2004), was described within the context of ecopsychology. The purpose of the nature connectedness construct is to help researchers study the experiential, emotional connection one has with nature. The CNS is a 14-item Likert-style questionnaire that explores the extent to which one feels emotionally connected to nature (Mayer & Frantz, 2004). The instrument was administered to nearly 550 participants (both college and non-college participants) in five different studies to determine validity and reliability (Mayer & Frantz, 2004). Across studies the CNS demonstrated high test-retest reliability and high discriminant validity. Participants scoring high on other measures of human-nature connectedness as well as the CNS reported increased environmental involvement and participation in environmental agencies. In addition, the affective factor of the CNS accounted for nearly 38% of the variance in total scores. CNS has also been associated with higher pro-environmental characteristics (Mayer & Frantz, 2004). To date, the CNS

has not been included in studies designed by researchers to assess the ecological unconscious.

Research. A paucity of research currently exists within ecopsychology theory that lends support to Roszak's (1992) theoretical claims. Thompson (2009) conducted a literature search using five databases that included Psych Info, Biomed Central, International Bibliography of the Social Sciences, Pub Med, and Web of Science. Thompson searched the word 'ecopsychology.' He retrieved 125 hits. Fifty-three percent of the hits (n = 66) included peer-reviewed journal articles and of those, 3% (n = 2) included original data. The original data from those two articles included case studies (Burns, 2000; Santostefano, 2008). The remaining 97% of the journal articles included book reviews (n = 8), theoretical papers (n = 49), interviews (n = 2), and articles that were not written in English (n = 5). Thompson concluded that more research needed to be conducted on ecopsychology theory to substantiate its claims.

Currently, most articles published in the peer-reviewed journal titled *Ecopsychology* (first published in 2009) are theoretical in scope (Age & Johnsen, 2011; Cookson, 2011; Snell, Simmonds, & Webster, 2011). Most of the research findings reported in the journal include the human connection with nature as it relates to promoting sustainable ecological behaviors as opposed to focusing on human wellness (Celedonia & Rosenthal, 2011; Koger, 2009; Leger & Pruneau, 2011). Although some researchers have studied the human-nature connection and human wellness in the context of ecopsychology (Hennigan, 2010; Norton & Holguin, 2011; N. W. Wilson et al., 2011),

the ecological unconscious has yet to be operationalized within the studies. As the theory stands, ecopsychology awaits empirical investigation into its core tenets.

Olza and MacDonnell (2010) claimed that the ecological unconscious develops at birth yet its development could be stunted if the infant does not experience natural birthing, breast feeding, and close contact with the mother. If such events do not occur the infant might experience subsequent alterations in brain chemistry that could normalize a disconnection from nature and deterioration of the ecological unconscious. The authors cited research from womb ecology, birth psychology, and neurobiology to support their beliefs. Olza and MacDonnell called for more research to be conducted on the effects of natural versus non-natural birthing methods and child rearing in evaluating the ecological conscious. To date, no research has been conducted to further substantiate Olza and MacDonnell's claims.

The term "ecological consciousness" was included in one auto-ethnography study (P. R. White, 2011), where it was described as including awareness about one's connection with non-human nature, personal identification with nature, intrinsic valuing of nature, a concern for the environment, interest in self-realization, understanding the "global environmental crisis" (p. 42), and coping with global and personal concerns through connecting with nature. P. R. White (2011) developed structured mindfulness-based perception exercises to deepen her connection with nature and enhance ecological consciousness. P. R. White spent 33 sessions in natural settings near Sydney, Australia, and the sessions varied between one and two hours. Each session included a uniform sequence of meditation and mindfulness, with a capstone activity designed to enhance her

connection with nature. A thematic analysis of the results suggested 16 thematic categories, which the author utilized as evidence for a deeper connection with nature and an enhanced ecological unconsciousness. To date, no other research has been conducted on ecological consciousness or on the ecological unconscious. In particular, no research has linked the ecological unconscious to wellness. However, wellness has been found to be associated with ecopsychology theorists' goal of promoting human wellness through ecologically sustainable behaviors.

Orientation to wellness. Although wellness has not been linked directly with the ecological unconscious, ecopsychology theorists have posited that humans are more likely to experience restoration of the ecological unconscious (i.e., wellbeing) and greater spiritualty when the earth around them is also well (Roszak, 1992; Kasser, 2009). Some scholars have discussed ecopsychology in the context of promoting a strong environmental identity. Clayton (2003) described environmental identity as feeling connection to the natural environment based in our belief that nature is somehow part of who we are. Environmental identity development has most often been associated with promoting environmental beliefs and actions to protect the natural environment (Cantrill, 1998, Kempton & Holland, 2003), Thus, a major purpose of ecopsychology is to restore human wellness through the promotion of sustainable behaviors or enhancing environmental identity (i.e., recycling, consuming organic foods, etc.). It is believed that when other living organisms and the physical environment are healthy, humans will experience optimum wellness. Some researchers have made links between ecologically sustainable behaviors and wellness (Jacob et al., 2009; Kasser, 2009).

Kasser (2009) argued that ecological degradation is linked to a psychological sense of safety/security, feelings of competence, relatedness with other humans, and autonomy. He believed that partaking in ecologically sustainable behaviors can promote the satisfaction of these needs and therefore, wellness. In fact, wellness and ecological behaviors (i.e., eating organic foods, giving environmentally friendly gifts, turning off the lights, recycling, and reusing various goods) have been linked to reduced stress, increased happiness in adolescents, higher life satisfaction, and positive affect (K. W. Brown & Kasser, 2005, Study 1; K. W. Brown & Kasser 2005, Study 2).

In a series of studies, Mayer and Frantz (2004) connected an "environmentalist" identity directly with nature connectedness and a measure of well-being. The authors correlated five items of life satisfaction (which the authors suggested represented well-being). For example, one item stated, "I am very satisfied with my life" (p. 510). The life satisfaction scale was reliable with an alpha equal to .84 and the authors concluded that connectedness to nature has positive effects on wellness.

Jacob et al. (2009) explored relationships between ecologically sustainable behavior, mindfulness, and subjective wellbeing utilizing a survey design. The sample included 829 members of the Buddhist Peace Fellowship located in California. Wellness was assessed through a general happiness continuum that included ten spaces from "not all that happy" to "very happy." The authors also included a modified version of a classic semantic differential (A. Campbell, Converse, & Rogers, 1976). A list of bipolar adjectives asked participants to place themselves along a continuum on eight items (i.e., happy versus sad). The authors created the mindfulness and ecologically sustainable

behavior measures. The environmentally responsible behaviors measures included sustainable household choices, sustainable food practice, and recycling behaviors. Ecologically sustainable behaviors accounted for a significant portion of the variance in subjective wellbeing, 5.8% while mindfulness meditation accounted for 15.7% of the variance. The authors concluded that ecologically sustainable behaviors and mindfulness contribute to subjective well-being. The authors did not report limitations of the study.

The underlying aspects of ecopsychology have also been linked to the enhancement of spirituality in nature, although it remains unclear in the research how spirituality connects with the ecological unconscious. For example, Ellard, Nickerson, and Dvorak (2009) interviewed non-residents on vacation in Montana. Forty percent of participants described their vacation using terms associated with spirituality. The authors categorized participant responses into themes that included feelings of closeness to and appreciation for God, a sensation of peace and calm, and appreciation for nature. In a similar study, Daniel (2007) found that participants reported greater awareness of God, nature, and self as a result of the wilderness trip.

Unruh and Hutchinson (2011) conducted an investigation in which they utilized a qualitative investigation grounded in in phenomenology. They explored the meanings of leisure gardening across different individuals presenting with non-illness, cancer, chronic illness, and experiencing bereavement (N = 42). A constant comparative approach was utilized in developing themes, of which the content was collected through four different interviews in one year with each individual. Results suggested that gardeners perceived their garden as a spiritual place and the act of gardening was described as a spiritual

journey. Participants with religious affiliations envisioned their gardens as extending from their spiritualty and reaffirmed their values and beliefs. Persons who were spiritual but not religious considered their sense of spirituality within the context of their connection with their garden. The researchers concluded that spirituality could be greatly influenced through one's connection with nature.

Researchers have found positive links between ecologically sustainable behaviors (Jacob et al., 2009; Mayer & Frantz, 2004), spirituality (Unruh & Hutchinson), and measures of wellness. Such empirical findings provide support for ecopsychology's premise that wellness in individuals is connected with wellness within the natural environment via human actions that promote its wellbeing as well as the need for one to be in connection with nature in order to be well. Thus, some research evidence supports the general aspects of the theory, although ecopsychology theory has been challenging to validate.

Summary. Ecopsychology theorists have posited that humans achieve optimum wellness when their natural surroundings are thriving. A major goal of ecopsychology theory is to expand one's ecological unconscious to promote wellness both in the individual and in nature (Roszak, 1992). No instrument has been created to assess the underlying tenets of ecopsychology but a related measure has been developed to assess the human-nature connection (Mayer & Frantz, 2004). As of this writing, no researchers have operationalized the ecological unconscious, although several studies (K. W. Brown & Kasser, 2005; Jacob et al., 2009) have provided evidence linking ecologically sustainable behaviors, an environmentalist identity, and wellness.

Hoelteroff (2010) suggested that ecopsychology theorists and researchers need to decide whether ecopsychology is a theory, science, philosophy, or religion. As it stands, ecopsychology lacks a testable definition and scientific foundation to test such a definition. Hoelteroff argued, “Theories built entirely on anecdotal speculation and philosophy alone close the process of examination and truly become shallow” (p. 66). In a much more specific synopsis of the theory, Hibbard (2003) noted, “Ecopsychology lacks a solid theoretical basis, is deficient in research, and has no well-defined methodology or practice” (p. 46).

Ecopsychology theory lacks a falsifiable definition and currently research is lacking to support theoretical claims. The theory of biophilia (E. O. Wilson, 1984) was developed in the same time period as ecopsychology and includes several similar theoretical challenges that ecopsychology possesses. However, biophilia has received greater empirical support than ecopsychology, resulting in more evidence that supports the human-nature connection.

Biophilia. Biophilia theory (E. O. Wilson, 1984) has attracted attention across disciplines and within mainstream culture for its focus on sustainability and promoting a higher ethic for the natural environment. Although the theory possesses some of the same challenges as ecopsychology, the findings of several studies (Balling & Falk, 1982; Lohr & Pearson-Mims, 2006) have been utilized in support of biophilia’s theoretical underpinnings. In this section, biophilia, the research posited to support the theory, assessments following from the theory, and links to wellness are examined.

Definitions. Biophilia was developed by Wilson (E. O. 1984) to describe the propensity for humans to seek connection with other living systems. Wilson first defined biophilia as the "innate tendency to focus on life and lifelike processes" (p. 1). He later emphasized the "innately emotional affiliation of human beings to other living organisms" (E. O. Wilson, 1996, p. 165). The development of several important constructs have aided in the study of biophilia.

Key constructs. The major premise of biophilia is that the human species adapted over its history to engage with and rely on other non-human species to aid in humanity's survival. Humanity was able to adapt because it learned a variety of rules that included both attraction and aversion (i.e., biophobia) from other species and landscapes. E. O. Wilson argued that such a learning process occurred through biocultural evolution, the process by which culture was developed through hereditary learning predispositions while the genes dictating such propensities were spread through natural selection within cultural contexts (E. O. Wilson, 1996). He described the biocultural evolution as a "gene-culture coevolution" where "a certain genotype makes a behavioral response more likely, the response enhances survival and reproductive fitness, the genotype consequently spreads through the population, and the behavioral response grows more frequent" (E. O. Wilson, 1996, p. 167). Thus, even in our species' recent history where we have further removed ourselves from the "wild," our genetic learnings are not yet lost and are suffocated within the built environments in which we have hidden ourselves. Thus, we are left with a longing to be with, in, and around settings with other species.

Kellert (1976) introduced a typology that he later described as biophilic tendencies (1993) to describe a biological basis for why humans value nature. After introducing the typology, Kellert utilized questionnaires throughout studies to research the proposed ethics surrounding nature, including the study of perceptions of animals (Kellert & Berry, 1987; Kellert, 1985) and the process of identifying how different cultures value nature differently (Kellert, 1978, 1991). The typology includes the following nine categories: "Utilitarian," "Naturalistic," "Ecologistic-Scientific," "Aesthetic," "Symbolic," "Humanistic," "Moralistic," "Dominionistic," and "Negativistic." A description of the nine values is beyond the scope of the current discussion, but Kellert argued that these categories of the biophilia were dependent on and resulted from human evolution. Kellert utilized questionnaires in various studies operationalizing the biophilic tendencies but such questionnaires have not been tested for validity and reliability.

Together, these nine biophilic tendencies have been studied in the context of understanding how different populations value nature (Kellert 1976, 1980). Interestingly, these values have not been studied in the assessment of the core tenets of biophilia theory and no instrument has been developed and empirically validated to study the constructs underlying biophilia. However, Kellert's typology has recently been operationalized in the form of questionnaires in the study of values of trees (Delavari-Edalat & Abdi, 2009, 2010). In addition, Nature Relatedness (Nisbet et al., 2009) has been introduced as a way to approximate biophilia theory.

Assessment. Proponents of biophilia have argued that at its core biophilia is the affiliation humankind share with nature (Kellert, 1993; E. O. Wilson, 1984). The major theorists of biophilia have yet to develop an empirically validated measure including the underlying constructs of the measure, but recently Delevari-Edalat and Abdi (2009, 2010) operationalized the biophilic tendencies through an 18-item questionnaire purported to measure people's attitudes towards trees. The questionnaire is answered on a five-point Likert scale, one indicating strongly disagree and five indicating strongly agree. In one study (2009), the researchers utilized 52 respondents attending a park. The researchers used 65 participants in a separate study (2010). The same questionnaire was used in each study and two questions operationalized each of the nine biophilic tendencies. All questions assessed one's values towards trees, with exception to the 'negativistic' ethic, which asked respondents to consider the park in general. Neither study included a rigorous methodology (i.e., factor analysis) to test for the reliability for validity of the instrument. To date, the questionnaire has not undergone a rigorous test for validity or reliability or has it been included in other empirical studies.

Nisbet et al. (2009) recently developed the nature relatedness construct as a way evaluate a person's connection with nature (Nisbet et al., 2009). The development of the instrument was discussed within the context of biophilia, although the measure does not assess the underlying theoretical features of biophilia. The original 30-item NR was developed and tested with 831 undergraduate psychology students in Canada. The scale is answered on a five-point Likert scale, one indicating strongly disagree and five indicating strongly agree. Factor analysis suggested that NR measured the affective,

cognitive, and experiential components of one's connection with nature (Nisbet et al., 2009). The affective factor consisted of how a person's thoughts and emotions are affected by his or her connection to nature; the cognitive factor included cognitive awareness of how one impacts nature with his or her actions; the experiential factor included the extent to which one actively seeks out nature as a place to be in. The three factors accounted for a combined 34% of the variance. The NR displayed moderate effect sizes with environmental behaviors, had moderate internal consistency, and possessed moderate to high test-retest reliability. In addition, the NR demonstrated high discriminant validity when predicting self-reported environmental behaviors. Thus, the NR does appear to measure three components of nature relatedness, though more research is needed to further test the construct of nature relatedness (Nisbet, Zelensky, & Murphy, 2010).

The NR construct (Nisbet et al., 2009) was developed to assess one's cognitive, affective, and experiential connection with nature. Delavari-Edalat and Abdi's (2009, 2010) operationalization of the biophilic tendencies was developed to assess attitudes towards trees. Although both of these instruments were developed within the context of biophilia theory, neither was purported to assess the underlying dimensions of the biophilia (i.e., innately emotional affiliation, biophobia, gene-culture co-evolution). Despite the lack of assessment in biophilia, scholars (Kahn, 1997; Kellert & Wilson, 1993) have argued that much evidence exists to support their theoretical claims.

Research. In a review of the literature Kahn (1997) claimed that evidence for biophilia comes in several forms. Among the research cited that is used to support

biophilia theory, Kahn argued that evidence is found in literature associated with a human preference for savanna-like environments over others, biophobia (i.e., fear of snakes, rats, spiders, blood, and heights), and people's affiliation with animals. Most of the research has not been conducted to specifically provide support for biophilia theory, but scholars committed to the tenets of biophilia use such research evidence to support their claims (Kahn, 1997; Ulrich, 1993).

Gullone (2000) contended that support for the biophilia hypothesis is found in the fact that much of human evolution occurred in savanna environments and in particular East Africa (Kahn, 1997). Within savannas, there is more openness (i.e., fewer large trees present and thinly spread, thus increasing sight distance) and better ability to identify predators and escape if necessary. Across studies, research has demonstrated that humans prefer settings that include spatial openness, scattered trees and a disbursement of grass-like ground cover as opposed to dense forests, the built environment, or deserts (Balling & Falk, 1982; Falk & Balling, 2010; R. Kaplan & Kaplan, 1989).

Balling and Falk (1982) found that a sample of Americans preferred visual settings of savannas as much as coniferous and deciduous forests, despite the sample generally being more familiar with (i.e., living near or spending time in) coniferous and deciduous forests. In a similar study, Falk and Balling (2010) utilized a sample of three different populations from West Africa. Sample 1 ($N = 27$) and sample 2 ($N = 36$) included children ages 12 to 18, with both samples being taken from different geographic locations (i.e., agricultural landscapes versus a small fishing village on an island). Sample three ($N = 37$) included students from a technical college ages 20 thru 39. The first two

samples were shown 45 pairs of photographs of landscapes that included a combination of 10 different scenes (i.e., rain forest, deciduous forest, coniferous forest, tropical savanna, or desert). Participants were then asked which place they would like to live in the most. The third sample was shown 20 randomly ordered slides that represented each biome just described. Across groups, participants preferred the savanna settings over all others. The researchers concluded from this result that humans had an innate preference for savanna-like settings. The authors provided cross-cultural support for their claim that humans have an innate preference for savanna environments. Although the authors did not provide limitations, small sample size, uniform non-random samples, and a descriptive design limit the generalizability of the findings.

Lohr and Pearson-Mims (2006) studied preferences for spreading, rounded, and conical tree forms with a sample of 206 participants in the Pacific Northwest. They suggested that tree forms in savanna environments typically bear spreading tree forms and hypothesized that persons would have preferences for spreading tree forms more than any other type. Researchers randomly assigned participants to one of two conditions with pictures that included and excluded trees in urban settings. Each experimental setting included four pictures. The settings differed based on the pictures' density of the tree's branches (high versus low density), in the inanimate object illustrated in the non-tree image, and in urban setting. Both conditions included four images. Each image included an urban scene (i.e. a near or far-off building) and either a conical tree (i.e., a coniferous tree), rounded tree (i.e., a deciduous tree), or tree with spreading features (i.e., an acacia-shaped canopy with a smaller trunk). The additional image included in each setting

included an inanimate object (i.e. a sun dial or a set of columns) without the presence of any trees. Researchers measured the aesthetic experience, affective responses, skin temperature, and blood pressure in both groups before, during, and after the experiment utilizing a within-groups design. No statistically significant differences were recorded for skin temperature or blood pressure. In general, participants rated images with trees more favorably than scenes without trees. Researchers also found that participants rated spreading trees as being more attractive than conical shaped or rounded trees. Participants reported feeling happier when viewing a spreading tree. Participants also favored the denser canopies of trees compared to the less dense trees. Lohr and Pearson-Mims (2006) believed that the denser trees were selected as more highly favorable because of their historical purpose of helping humans with survival (e.g., safety). The researchers concluded that the preference for spreading trees were consistent with the innate, evolutionary affiliation humans have with savanna environments.

Ulrich (1993) argued that evidence for biophilia also lies in the genetic basis humans possess for phobias of natural organisms such as snakes and spiders. Classical conditioning experiments have shown that fearful or phobic reactions are often acquired and resistant to extinction for living organisms such as snakes or spiders but not for more dangerous stimuli, such as a handgun (Öhman, 1986; Öhman & Soares, 1994). Such findings provide evidence that there may be a genetic link between fear response and other life-threatening organisms. A handful of twin studies have provided further evidence that some fears to animals possess a familial or genetic origin (Fyer et al., 1990;

Kendler, Myers, Prescott, & Neale 2001; Kendler, Neale, Kessler, Heath, & Eaves, 1992).

Kendler et al. (1992) explored the genetic etiology of phobias in American female twins. Researchers interviewed 2,163 women, one-third of whom presented with a self-reported phobia (i.e., animal phobia, agoraphobia, social phobia, or situational phobia). A history of phobia was assessed through a modified version of the Phobic Disorders section of the Diagnostic Interview Schedule Version III-A (Robins & Helzer, 1985). Several multivariate models resulted in the conclusion that genetic factors play a significant role in developing phobias to animals (i.e., spiders, bugs, bats, or snakes). Researchers suggested that the findings were not associated with family environmental factors and that environmental experiences were least important in the development of phobias that included animal phobias. While family environmental factors were associated with the development of agoraphobia, Kendler and colleagues suggested that the results were indicative of a genetic basis for animal phobias. Among the reported limitations, the researchers cited the sample as all female and consisting entirely of twins, thus limiting the generalizability of the findings.

To account for previous studies that mostly included all female twins in exploring the etiology of phobias, Kendler et al. (2001) conducted a study with all male twins. The study included 1,198 male-male twin pairs taken from a population-based registry. Researchers interviewed participants utilizing the Diagnostic Interview Schedule Version III-A (Robins & Helzer, 1985) and assessed for a lifetime history of agoraphobia, and social, animal, situational, and blood/injury phobias. Utilizing multivariate analysis,

researchers found that among 36% of the variance of animal phobias could be accounted for by genetic factors. Similar to Kendler et al.'s (1992) study that included only female twin pairs, family-environment played a greater role in the development of social phobias and agoraphobia than in the other phobias. Kendler and colleagues (2001) concluded that that genetics play a role in the etiology of phobias and associated irrational fears.

Humans possess a strong affiliation with non-human animals (i.e., domesticated pets and non-domesticated vertebrates). Fossil evidence shows that humans have had connections with animals as far back as 500,000 years (O'Haire, 2010). In addition, nearly 63% of families in the United States own domesticated pets (American Pet Products Manufacturers Association, 2008) and the presence of zoos in nearly every major city suggests that humans have a strong fascination and fondness of animals (E. O. Wilson, 1993).

Being in the presence of non-human animals also positively impacts human physical and mental health. For example, after major heart surgery, more pet owners than non-pet owners were found to be alive (Friedmann, Katcher, Lynch, & Thomas, 1980), possibly because pets possesses an ability to reduce stress and improve overall mental health (Friedmann, 1995). The presence of fish thanks have also been found to decrease heart rate and blood pressure, often prompting dentist offices and other waiting rooms to include fish tanks (A. M. Beck & Katcher, 1996). Across many situations, when animals are present people perceive situations as less stressful, thus decreasing mental health (O'Haire, 2010).

Researchers have also found that interaction with animals can decrease mood symptoms in depressed patients (Antonioli & Reveley, 2005). Antonioli and Reveley conducted a randomized control trial with 30 patients presenting with mild to moderate depression to two conditions. The experimental condition included interaction with a dolphin for two weeks in an outdoor environment in the ocean. The control condition included the same aquatic environment as the experimental condition but lacked contact with a dolphin. Participants were exposed to these treatments for a total of ten days over a two-week span. Depression and anxiety were assessed pre and post-test in both conditions utilizing the Hamilton Rating Scale for Depression (Hamilton, 1967), the Beck Depression Inventory (A. T. Beck, Ward, Mendelson, & Erbaugh, 1961), and the Zung Self Rating Scale of Anxiety (Zung, 1971). The Participants in the experimental condition experienced significant decreases in depressive symptomology relative to the control condition. Researchers cited limited generalizability and patient knowledge of the interventions as limitations for the study. Antonioli and Reveley (2005) concluded that interaction with animals in a natural environment is more effective than interaction with a natural environment by itself, suggesting that such a difference was accounted for by biophilia.

Combined, the research reported here lends some support to biophilia. Humans possess preferences for savanna-like environments, appear to possess genetic components related to the phobias of some animals, and an affiliation for non-human animals. Scholars of biophilia have suggested that such empirical evidence supports their assertion that humans have an innate, genetically-based affiliations with nature (Kahn, 1997;

Kellert & Wilson, 1993). Theorists and researchers have also argued that the association the innate connection humans share with nature facilitates wellness.

Orientation to wellness. According to theorists of biophilia, the more humans engage with nature, the more they connect with their evolutionary roots. The more they engage with their evolutionary roots the more wellbeing humans will experience as a result (E. O. Wilson, 1984). Kellert (1993) stated, "The pursuit of the 'the good life' is through our broadest valuational experience of nature" (p. 60). Kahn (1997) cited studies relating nature with the restoration of mental fatigue (R. Kaplan & Kaplan, 1989) and recovery from stress as evidence (Ulrich, 1993) for biophilia. To date, no researchers have directly linked the theoretical underpinnings of biophilia with wellness. However, some researchers have cited biophilia as a reason for nature having positive impacts on human wellness (Antonioli & Reveley, 2005).

In a recent study, A. J. Howell et al. (2011) conducted two studies to predict psychological health with one's connection with nature with a sample of undergraduate students. They cited biophilia as the theory guiding the study. Study one included 452 introductory psychology students at a Canadian university. Respondents completed the Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004), a measure of emotional wellbeing (Keyes, 2005), psychological well-being (Ryff, 1989), and social well-being (Keyes, 1998). Results obtained included significant bivariate correlations between CNS and psychological and social well-being. Study two included 275 introductory psychology students at a Canadian university. Respondents completed the same assessments as in study one in addition to completing the Nature Relatedness scale (NR;

Nisbet et al., 2009) and the Allo-Inclusive Identity Scale (an additional measure of nature connectedness; Leary, Tipsord, & Tate, 2008). Each measure of nature connectedness was significantly correlated with psychological and social wellbeing. NR and CNS were also connected with emotional wellbeing. The researchers concluded from these findings that wellbeing and nature connectedness is associated. Higher wellness is related to feeling more connected with nature. The authors cited both the environmental context (i.e., it was severely cold in Canada at the time of study one) as a limitation of the study, as well as the inability to determine causality between the study variables.

Wellness is an assumed component of biophilia theory (Grinde & Grindal Patil, 2009). The multidisciplinary research has been utilized as evidence for the legitimacy of the theory (Kahn, 1997). Such research evidence has included attention restoration and stress reduction (R. Kaplan & Kaplan, 1989; Ulrich, 1993). More recent research has linked nature connectedness with different measures of wellness, although a dearth of research has been linked to measures of human wellness to the underlying tenets of biophilia theory.

Summary. Biophilia theorists have posited that humans achieve optimum wellness when they affiliate with their genetic need to affiliate with other living organisms (E. O. Wilson, 1984). A major goal of biophilia theory is for the individual to reconnect themselves with their evolutionary roots to facilitate the wellness of the individual and that of nature. No instrument has been created to assess the underlying tenets of biophilia but a related measure has been developed to assess the innate connection humans share with nature (Nisbet et al., 2009). Currently, no researchers have

operationalized biophilia or its underlying constructs, although several studies have provided evidence linking biophilia theory and wellness (Antonioli & Reveley, 2005).

Simaika and Samways (2010) criticized biophilia theory as rarely cited in peer-reviewed journals; they also argued that the theory could not be easily tested. Kahn (1997) acknowledged that critics might identify biophilia as "slippery, and difficult to grasp and understand except in metaphorical (unscientific, nontestable) terms" (p. 25). Joye and De Block (2011) argued that the biophilia is not falsifiable. In particular, these scholars picked apart E. O. Wilson's (1984) original definition of biophilia, suggesting that the terms "innate," "focus," and "life or life-like" processes are ambiguous within the definitions. As such, they charged that biophilia is susceptible to conflicting interpretations, that the empirical evidence could be accounted for by alternative theories or hypotheses, and that the evolutionary reasoning underlying the theory is unclear and often inaccurate. An additional limitation lies in the form of biophilia's research evidence. Very little research has been conducted to directly assess biophilia's core tenets. Biophilia theorists seem to cite research in other fields to support their assertions without then conducting further studies to assess its constructs.

Biophilia theory possesses many of the same challenges as ecopsychology in lacking a falsifiable definition as well as research to support its constructs. However, biophilia theory seems to have some empirical evidence that indirectly supports the general assertion that humans possess an innate affiliation and biological need to connect with other living organisms. Nonetheless, biophilia has not escaped criticism (Joye & De Block, 2011) and other theories warrant consideration in discussing wellness connections

between human and nature. The discussion now shifts to an exploration of constructs, theories, and associated research where nature is conceptualized through a lens of place attachment, human restoration, and stress reduction. Each provides an alternative explanation for why humans seem to experience wellness from exposure to nature. Place attachment and associated research is first described.

Place attachment. Ecopsychology and biophilia have just been portrayed as theories of nature grounded in arguments and research indicating an inherent human connection with nature. Within these theories, connection with nature is viewed as a necessity for human wellness. In place attachment, it is assumed that human wellness is attained through connecting with 'place,' which is not limited to natural settings in its conceptualization. Human wellness occurs through a healthy attachment with the places in which they reside and visit (Hernandez, Hidalgo, Salazar-Laplace, & Hess, 2007; Mazumdar, 2005). In this section, place attachment and its related constructs are defined and discussed. Place attachment assessment and place attachment research are explored with a particular emphasis on places consisting of natural settings. Associations between wellness and place attachment are then considered.

Definitions. Williams, Patterson, Roggenbuck, and Watson (1992) described *place* as the "functional meaning of a place as the tendency to see the environment as a collection of attributes that permit the pursuit of a focal activity" (p. 31). Several concepts have been defined in the discussion of place attachment relevant to nature, although a theory of place attachment has not been developed. Rather, attachment is a combination of several constructs that warrant individual and collective attention.

Attachment has been defined as the biological bond formed between an infant and caregiver that aids in its survival (Bowlby, 1982, 1991). Attachments develop from early bonds between the parent-child relationship, thus influencing early mental images of self and others. Such representations assist in the interpretation of social stimuli that serve as a foundation for the individual's expectations and experiences in future relationships (Bowlby, 1982). Attachment to place (or place attachment) is the emotional bond between person and environment (Mazumdar, 2005). It has been defined as the "affective link that people establish with specific settings, where they tend to remain and where they feel comfortable and safe" (Hernandez et al., 2007, p. 310). According to Wells and Lekies (2006), persons who describe themselves as having connections with nature often depict themselves as having positive relationships with nature as children. They concluded that partaking in activities such as hiking, camping, planting trees and picking flowers as adults were related to time spent in nature prior to age 11. In addition, Hernandez and colleagues suggested that place attachment develops through mobility (physical movement within place), length of residence, shared meanings, and social belonging.

Key constructs. Place attachment is a multifaceted construct created to describe one's emotional bond or connection with a setting. Ramkissoon et al. (2012) recently developed a conceptual framework for place attachment within the sustainable tourism literature describing place attachment as a combination of place identity, place dependence, place affect, and place social bonding. There has been considerable disagreement about the differences and similarities between place attachment and place

identity, partially stemming from studies that demonstrate the strong overlap between the constructs (Vidal, Pol, Guardia, & Peró, 2004). Some scholars have suggested that they consist of the same construct (B. Brown & Werner, 1985); others have combined the two terms into a 'sense of place' definition (Jorgensen & Stedman, 2001). Place identity was first defined by Proshanksy (1978) as

> those combinations of the self that define the individual's personal identity in relation to the physical environment by means of a complex pattern of conscious and unconscious ideas, beliefs, preferences, feelings, values, goals, and behavioral tendencies and skills relevant to this environment. (p. 155)

Place identity, then, can be distinguished from place attachment in that it is considered the conscious and unconscious identification one experiences with a physical environment.

Place dependence (Stokols & Shumacker, 1981) has been described as the functional attachment between the individual and the specific place or the bond established between the person and the physical characteristics of the place (Ramkissoon et al., 2012). Place affect is the emotional bond individuals experience with different settings (Rolero & De Picolli, 2010) or topophilia, which is a love of place (Tuan, 1977). Place social bonding is the tendency for people to become emotionally attached to settings where they experience interpersonal relationships and belongingness (Hammitt, Kyle, & Oh, 2009). Place identity, dependence, affect, and social bonding are all thought to contribute to one's emotional affiliation or attachment to place (Ramkissoon et al.,

2012). These and similar constructs have been operationalized in a variety of assessments within the multidisciplinary literature.

Assessment. Several research assessments have been developed in the measurement of place attachment (Kyle, Graefe, & Manning, 2005; Raymond et al., 2010; Williams & Vaske, 2003). Williams and Vaske (2003) proposed a two dimensional structure of place attachment, which included place identity and place dependence. The researchers utilized a convenience sample of college students (N = 65) who had reported visiting four particular outdoor places in Colorado (e.g., Rocky Mountain National Park, Cameron Pass, the Poudre River, and Horsetooth Recreation Area). A 12-item instrument was developed based on the previous literature to assess both place identity and place dependence. Six items were intended to measure place identity (e.g., "I feel 'X' is part of me.") and six items were created to assess place dependence (e.g., " 'X' is the best place for what I like to do"). Participants responded to the twelve items by rating them on a five-point Likert scale, one indicating strongly disagree and five indicating strongly agree. Researchers instructed participants to fill out 4 sets of the items where each set was based on the four different outdoor places in Colorado the researchers included in the study. The researchers utilized confirmatory factor analysis where the proposed factor structure was supported and the reported Cronbach's alpha of the place attachment scale ranged between .81 and .86 for each of the four places included in the study. Researchers also reported high convergent validity. For example, higher number of visits to a particular place, increased perceived familiarity with place, and the belief that a particular place was "special" were all associated with higher levels of place attachment. Thus, the

researchers concluded that a two-factor structure of place attachment existed within their sample.

Raymond et al. (2010) developed a place attachment instrument across two studies in which they predicted four dimensions of place attachment: place identity, place dependence, social bonding, and nature bonding. The only construct not already defined in the previous section, nature bonding, was defined as an "implicit or explicit connection to some part of the non-human natural environment" (p. 426). In study one, the researchers tested a 29-item instrument on a random sample of rural landholders in Australia (N = 320). Participants responded to the twelve items by rating them on a five-point Likert scale, one indicating strongly disagree and five indicating strongly agree. An exploratory factor analysis resulted in five dimensions of place attachment, which included Place Identity, Place Dependence, Nature Bonding, Family Bonding, and Friend Bonding. Cronbach's alphas for each of the scales ranged from .72 to .87. In study two, the researchers reduced the number of items to twenty and administered assessments to a random sample of a different region in Australia (N = 1323). The researchers utilized a confirmatory factor analysis that confirmed the five-factor structure that resulted from study one. Cronbach's alphas ranged from .65 to .91 for the scales. The researchers compared model fit of the five-factor model with that of a two-factor model (which included the Place Identity and Place Dependence dimensions, as in Williams & Vaske, 2003), and suggested that the five-factor model possessed moderate fit. Raymond and colleagues concluded that the five-factor model was an improvement over the two-factor structure.

Both assessment instruments just reported were developed to assess place attachment. Each assessment contained a diversity of concepts underlying place attachment, based in previous research. Although neither assessment has been included in a preponderance of studies, a breadth of research has been dedicated to the place attachment construct and its associated proposed dimensions.

Research. Place attachment and its closely related constructs have received substantial attention from researchers in the past decade. Some research has been dedicated to the study of place attachment and the human impacts of recreation on natural settings (Hinds & Sparks, 2008; Lawrence, 2012; D. D. White, Virden, & van Riper, 2008) while other research has served to explore relationships between emotional well-being and place attachment (Korpela & Ylén, 2007; Newnham, Boyd, Newnham, Francis, & Aisbett, 2008). Some researchers have also found connections between nature and place social bonding, although such findings have been identified outside of place attachment theory (Milligan, Gatrell, & Bingley, 2004; Wakefield, Yeudall, Taron, Reynolds, & Skinner, 2007; Weinstein et al., 2009). The studies cited here included foci on associations between place attachment and emotional and social well-being.

Newnham and colleagues (2008) conducted a phenomenological study on the experience of place for adolescents in a rural setting in Australia. The participants ($N = 3$) included adolescents ages 16, 17, and 18 coming from a rural setting. Participants were asked open-ended questions that included the importance, meaning, description of, and the problems and advantages of living in the rural community. An analysis of themes revealed that the adolescents within the study possessed strong affiliations with nature,

which the authors suggested represented place attachments, among others. The participants also expressed pride in their connections with their physical surroundings, which the researchers linked to playing a role in participant self-concept and identity development. While nature was not operationalized or discussed within this study, other researchers have studied the role of nature in place preferences and attachment.

Across studies, favorite places typically have included natural settings (i.e., parks, beaches, and forests) more so than any others (Korpela & Hartig, 1996; Korpela & Ylén, 2007; Korpela, Ylén, Tyrväinen, & Silvennoinen, 2009). Korpela and Ylén (2007) explored the relationships between perceived health, selection of place, and the experiential quality of places in four residential areas of Finland. The convenience sample included 211 residents between the ages of 19 and 82. Participants were given a 16-page questionnaire that included a housing history, perceived health status, experiences and sensitivity to noise, somatic symptom checklist, personal projects, attitudes toward housing policy, and experiences of favorite and unpleasant places. Open questions helped researchers identify favorite and unpleasant places. The researchers found that 51% of the favorite places included natural settings (i.e., nearby parks, woods, and seashores). In addition, persons with the most health complaints (i.e., headaches, chest pains, or dizziness) were more likely to identify natural spaces as favorite places than persons with fewer health complaints. The researchers also found that this portion of the sample benefited more emotionally from favorite places than others. The authors concluded that emotional regulation occurs in favorite places and in nature in particular.

Korpela et al. (2009) explored the reliability and stability of place selections and place attachment over a 10-month period. These researches randomly sampled two of Finland's largest cities (N = 1273). Participants were administered a twelve page questionnaire that included opinions about their residential area and nature, well-being, and background information. The questionnaire included two questions about attachment that were developed by the study authors. Researchers found a strong preference for urban woodlands, parks, and waterside environments. At the ten-month follow-up, 44% of the sample reselected the same favorite place with the highest reselected favorite places including gardens, beaches and harbor areas, and natural state areas. Indoor areas within the city were cited as having the lowest percentage of reselection after ten months. Overall, people were found to be more consistent in their attachment to favorite places in nature than in urban favorite places.

Participants within the sample also described nature as being more restorative than urban places. The study authors (Korpela et al., 2009) described the emotional restoration that people experienced from being in nature as reasons participants were disinclined to change their favorite places in nature at the ten-month follow-up. In a more recent study, Korpela, Ylén, Tyrväinen, and Silvennoinen (2010) concluded that restorative experiences in favorite places were more likely to occur in natural settings than when favorite places consist of settings in urban environments. Such findings suggest that natural places seem more restorative than non-natural or urban places that do not include nature. Korpela et al. cited memory bias (since researchers asked retrospectively about favorite places in nature) and socially desirable responding as

possible limitations of the study. The limitations of the both studies also included a lack of causality and generalizability of the findings.

Multiple researchers have empirically demonstrated the phenomenon of place social bonding in nature. For example, nature has been found to increase social contact with neighbors (Sullivan, Kuo, & DePooter, 2004), create better and more intimate relationships between neighbors (Kuo, Sullivan, Coley, & Brunson, 1998), decrease feelings of isolation (Milligan et al., 2004; Wakefield et al., 2007), and influence people to be more caring (Weinstein et al., 2009). Community gardens, neighboring plots in which individuals within a community grow their own produce, influence persons to act with increased kindness towards others (Wakefield et al., 2007). For example, Milligan et al. (2004) found that the garden plots of individuals who were either sick or away from home were well taken care of by the persons of neighboring plots.

Wakefield et al. (2007) utilized a community-based approach to exploring the health effects of a community garden in Toronto, Ontario. They utilized individual interviews and focus groups to capture garden participants' perceptions about the individual and community benefits of having a community garden. They recorded and transcribed all of the interviews and utilized thematic coding in analyzing the data. The authors reported that community gardens promote social health and community cohesion. Participants described the garden as facilitating acts of increased sharing of foods, culture, ideas for gardening, and recipes, and an increase of perceptions of connection with the community. Several participants commented on feeling less socially isolated as a result of the community garden. The study authors concluded that community gardens

serve to increase feelings of community, foster positive social interactions, and facilitate the process of sharing among community members.

Weinstein et al. (2009) conducted four studies in exploring the effects of nature on intrinsic and extrinsic value aspirations. Participants were randomly assigned to natural environments (i.e., pictures of natural landscapes in the first three studies or a room with four plants in the fourth study), or to non-nature environments (i.e., pictures of urban environments in the first three studies or a room without the four plants in the fourth study). Results suggested that participants in the more highly immersed natural settings self-reported higher intrinsic value aspirations, focused on relationship and community wellness, and evidenced by lower value aspirations placed on extrinsic values (i.e., fame and money). Participants exposed to the natural settings made more generous decisions, resulting in positive consequence on another participant than those in the non-nature setting. Such findings suggest that immersion in natural settings impact values associated with relationship and community wellness. Lastly, relatedness to nature and self-reported autonomy in natural settings predicted greater intrinsic and lower extrinsic values and an increase in generosity. The authors concluded that the more one feels connected with nature, the greater one's tendency to consider others' needs and meet those needs through generous acts. Thus, aspects of place attachment have been associated with several aspects of human wellness, including both emotional and social health.

Orientation to wellness. The wellness benefits of having a place that one feels attached to have been described as therapeutic (Fullilove, 1996). Considerable research

has included exploration between emotional wellness and places in nature (Korpela et al., 2009, 2010). In its core definition, place attachment and associated constructs have been described as the emotional affiliations people share with places (Ramkissoon et al., 2012). Safety and comfort lie at the center of place attachment and previous research has indicated that identity and self-concept (Newnham et al., 2008) and emotional well-being are impacted by one's affiliation with nature (Korpela et al., 2010).

In a study where researchers compared and contrasted the wellness effects of favorite and non-favorite places, Korpela and Ylén (2009) randomly assigned participants (N = 348) to one of three experimental groups. Participants were either told to visit a favorite place each day for five days, not to visit a favorite place each day for five days, or were given no instructions at all across five days in regard to visiting favorite place. All participants were instructed to maintain a journal of the places they had visited once per day and also complete a health diary. Restorative experiences (i.e., feeling more relaxed and attentive, having more energy, and self-confident) were reported more often by the favorite place group than either of the other groups, indicating a positive association between favorite place and wellness. It is also noteworthy that natural places were the most frequented of places by participants assigned to the favorite place group, although nature was not operationalized in this study.

Strong links have been made between place attachment and wellness in research. Despite the links made between place and wellness, place scholars have yet to develop a unified theory of place attachment explaining why humans tend to experience well-being in places where they experience an affiliation with place. Without such a theory, making

links within place attachment about nature and wellness is challenging. Therefore, it remains uncertain how and why attachment to natural places uniquely impacts wellness.

Summary. Earlier, place attachment was defined as the "affective link that people establish with specific settings, where they tend to remain and where they feel comfortable and safe" (Hernandez et al., 2007, p. 310). Place attachment has been operationalized through several assessments (Kyle et al., 2005; Raymond et al., 2010; Williams & Vaske, 2003) although, to date, these instruments have not been included in studies where researchers explored relationships between wellness and place attachment. Place attachment does appear to be linked with several aspects of wellness, and nature appears to be a restorative and favorite place described by many of the participants across studies. However, place attachment lacks a clearly delineated theory of place and in particular how the human affiliation with natural places uniquely contributes to wellness. Attention restoration theory (ART; R. Kaplan & Kaplan, 1989) addresses some of these gaps.

Attention restoration theory. ART (R. Kaplan & Kaplan, 1989) was developed to help researchers study the specific aspects of nature that contribute to wellness. ART's development has helped researchers make sense of empirical findings pointing towards the wellness effects of nature. In this section, ART and its underlying constructs are defined and discussed. ART assessment and ART research are explored. Associations between wellness and ART are then considered.

Definitions. ART theorists (R. Kaplan & Kaplan, 1989; Laumann, Gärling, & Stormark, 2001) have asserted that exposure to nature has the potential to restore

psychological health (i.e., concentration or mental fatigue) via effortless fascination with nature (e.g., observing clouds, a tree, or a fish lying in a stream). The concept of fascination plays a pivotal role in ART and is conceptualized in two ways (Scopelliti & Giuliani, 2004). By viewing nature (e.g., seeing images of a forest or green landscape) or being in nature (e.g., going on a walk in a forest), one's effortless or "soft" fascination restores focus and concentration, leading to a sense that one's mental energy has been reinvigorated. Such fascination occurs involuntarily and demands very little effort or energy. Soft fascination provides relief from our "hard" fascination, which is defined as the directed attention we must place toward activities or tasks that require full attention and effort to maintain concentration (e.g., watching TV or studying). Soft fascination occurs in restorative environments, those that help replenish one's focus and concentration (S. Kaplan & Talbot, 1983). These environments, which are often operationalized as nature, include the four following characteristics: a sense of being away, fascination, extent, and compatibility (R. Kaplan & Kaplan, 1989). The four dimensions of ART are described to provide greater understanding into the core concepts of the theory.

Key constructs. ART's conceptualization of restorative environments (or nature) includes four dimensions: being-away, fascination, extent, and compatibility (R. Kaplan & Kaplan, 1989). Being away includes a change in experience and landscape from one's day-to-day routine. Being away does not require one to be a great physical distance from one's typical place of work or home, but instead, a "change in one's thoughts from the pressures and obligations of everyday life" (Scopelliti & Giuliani, 2004, p. 424). Extent

of the environment includes the scope and sense of relatedness one experiences while being in a natural setting. Scope is the idea that there could be more to explore in the environment than what is initially observed. Relatedness is the perception that the elements of a particular setting are part of a larger whole. Therefore, extent prompts a sense of fascination within nature. Fascination, which has already been described, includes soft and hard fascination and refers to the ability of nature to capture one's attention involuntarily. Lastly, compatibility is the potential perceived fit between the environment's attributes and the individual's preferences or purposes within that setting (S. Kaplan, 1995).

A major concept of ART is that of directed attention (Scopelliti & Giuliani, 2004). Directed attention is the mechanism through which individuals focus on specific stimuli that often include uninteresting or undesirable tasks (i.e., reading a dissertation in a foreign field). Such a mechanism is described as aiding humans in survival and in maintaining jobs. S. Kaplan (1995) argued that some stimuli, such as nature, are naturally fascinating, and require very little directed attention to maintain focus or interest. Since humans evolved in nature, nature is thus innately fascinating and does not require directed attention (Scopelliti & Giuliani, 2004). A preponderance of research evidence has accumulated in support of ART (Berman, Jonides, & Kaplan, 2008; Faber Taylor & Kuo, 2011; Hartig & Staats, 2006; Laumann et al., 2001; Raanaas et al., 2011; Tennessen & Cimprich, 1995). In addition, the development of several research instruments have allowed researchers to study the four dimensions of ART (Hartig et al., 1997; Herzog, Maguire, & Nebel, 2003).

Assessment. Researchers have operationalized ART in the form of several research instruments. The Perceived Restoration Scale (PRS; Hartig et al., 1997) was one of the first scales developed to assess ART's tenets, and its psychometric properties have been evaluated in a number of different studies (Galindo & Hidalgo, 2005; Garg, Couture, Ogryzlo, & Schinke, 2010; Hartig et al., 1997; Ivarsson & Hagerhall, 2008). The PRS was designed to assess the four dimensions of ART and to assess the restorative potential of different settings. The PRS includes 16 items (e.g., "I have a sense that I belong here") that are rated on a seven-point Likert scale, with 0 meaning "not at all" and 6 indicating "completely." Participants are instructed to rate the extent to which a statement fits their experience of a given environment.

Hartig et al. (1997) utilized a sample of 115 undergraduate students in the development of the PRS. They instructed participants to spend an average of 14 minutes in a range of settings. The researchers utilized several different settings that ranged in being "natural" or "built," "outdoor" or "indoor," and "high" or "low" in restorativeness. In particular, they utilized a rock garden, outdoor mall, a formal study with a room full of plants and view of trees outside, and a parking garage as the settings in which they administered their assessments. After participants became familiar with the environment in each setting, they were administered a battery of assessments. A separate factor analysis was conducted for each setting (although the specific factor analytic methodology was not reported). A 4-factor solution was not stable across sites; rather, a two-factor solution, with extent (termed Coherence) and General Restorativeness (including being away, compatibility, and fascination) emerging from the data. The

researchers cautioned others to interpret the two factors with caution, as the four dimensions of ART were posited as independent from each other. Some researchers have substantiated the two-factor structure of the PRS (Garg et al., 2010) while others have expanded the factor structure (Purcell, Peron, & Berto, 2001).

Since its development the primary use of the PRS has been to assess what kinds of environments are perceived as restorative (Ivarsson & Hagerhall, 2008). Across studies (Felston, 2009; Hartig et al., 1997; Hartig & Staats, 2006; Laumann et al., 2001), viewing and being in nature (i.e., being in a park or a forest and having a view of nature, including murals) has been found to be perceived as more restorative to human attention and concentration than being in, near, or viewing the built environment (i.e., buildings). While much of the research in ART has included perceptual data, researchers have also linked ART to increased concentration (Tennessen & Cimprich, 1995) and decreases in ADHD symptomology (van den Berg & van den Berg, 2011).

Research. Direct research support for ART has resulted from studies in which researchers have identified links between the restorative effects of nature on concentration (Berman et al., 2008; Tennessen & Cimprich, 1995; Raanaas et al., 2011) and ADHD symptomology (Faber Taylor & Kuo, 2009, 2011). In general, it has been found that the more natural or green the setting, the greater one is able to concentrate or experience reductions in ADHD symptomology. For example, Faber Taylor, Kuo, and Sullivan (2001) surveyed parents ($N = 96$) of children ages 7-12 who had received a previous diagnosis of Attention Deficit Disorder (ADD) or ADHD. Parents were asked to rate the ADHD symptoms of their children, the types of environments children played in,

and which environments helped to mitigate symptomology. Researchers classified the environments as green (i.e., camping trip or playing soccer), not green (i.e., watching T.V.) or ambiguous (i.e., the activities or settings were ambiguous). The researchers found that the greener the setting, the lower the parental ratings of ADHD or ADD of children after spending time outside. Faber Taylor and colleagues cited issues of generalizability (i.e., limited geographic location and time of year) as limitations for the study.

More recently, Faber Taylor and Kuo (2011) utilized a similar methodology as Faber Taylor et al. (2001) when surveying the parents of 421 children. Results once again suggested that children with access to green play settings presented with decreased symptoms of ADHD than children who primarily played in built outdoor and indoor settings. The researchers concluded that the greener the setting, the less severe the ADHD symptomology. Faber Taylor and Kuo (2009) used a convenience sample of 17 children ages 7-12 who had been diagnosed with ADHD to explore how a walk in three different settings would impact attention. Each child walked in three different settings, separated by a week. The settings included a park, downtown area, and neighborhood. The participants completed several measures of concentration, including the Digit Span Backwards test, which instructs the participant to listen to a sequence of numbers, two to eight digits in length, and repeat the sequence in reverse. Faber Taylor and Kuo found that children diagnosed with ADHD concentrated significantly better after a walk in the park than on either the downtown or neighborhood walks. They reported sizeable effect sizes (Cohen's D = .52 and .77), suggesting a large effect of nature on concentration.

They concluded that a 20-minute walk could elevate attention levels in children who present with ADHD and recommended that nature walks serve as an alternative form of treatment for ADHD. The researchers cited limiting sampling as a limitation of the study.

Several other studies have demonstrated the restorative impacts of nature on human concentration (Raanaas et al., 2011). Tennessen and Cimprich (1995) studied the attention of 72 undergraduate students utilizing a variety of attentional instruments. Researchers found that undergraduate students who had a view of nature (i.e., trees) from their dorm room performed significantly better than persons without views of nature on the attentional tasks. Berman and colleagues (2008) compared the cognitive benefits of interacting with nature versus urban environments across two experiments. In experiment one, participants (N = 38) were assigned to either a 50-minute walk in a downtown arboretum or in a downtown urban setting, after which they completed the Backwards Digit Span task. In experiment two (N = 12) participants were assigned to view pictures of natural images or images of cities, after which they completed the Backwards Digit Span task and the Attention Network Task. In both experiments participants were first assigned attention-consuming tasks where the intent of researchers was to fatigue attention, which was followed by exposure to either urban or natural interactions with nature. In both experiments, Berman et al. found that the nature conditions improved directed attention abilities, operationalized as the Backwards Digit Span task and the Attention Network Task. The authors concluded that ART was a valid theory as a result of the study and cited no limitations of the study. Despite the empirical evidence that has

accumulated in support of ART, more research is needed in this area to determine the degree to which positive nature contributes to other dimensions of human wellness.

Orientation to wellness. Extensive research has been conducted on ART and much of it has included aspects of psychological health, such as the restoration of concentration and the alleviation of ADHD symptomology (Berman et al., 2008; Faber Taylor & Kuo, 2011). The theory of ART was described as impacting cognitive function and did not include other dimensions of wellness (i.e., emotional, social, or spiritual) within its description of the restorative properties of nature (R. Kaplan & Kaplan, 1989). To date, the research directed in support of ART has been dedicated to the study and assessment of perceived restorative environments (i.e. nature). Therefore, scholarly inquiry in the area of ART has yet to include research targeting the development and maintenance of holistic wellness through nature.

Summary. ART is a well-researched and well-accepted theory among many social researchers (Faber Taylor & Kuo, 2011). It was developed to describe how individuals can renew concentration and reduce mental fatigue through exposure to nature (R. Kaplan & Kaplan, 1989). ART has been operationalized through the development of several research instruments (Hartig et al., 1997; Herzog et al., 2003). In particular, the PRS (Hartig et al., 1997) has received much attention within the literature, although the measure has been found to include varying numbers of factors, depending on the study (Hartig et al., 1997; Garg et al., 2010; Purcell et al., 2001). To date, the inclusion of the PRS in research directly linking the core tenets of ART with the restorative properties of nature has been limited.

The research published in support of ART has included both descriptive (Faber Taylor & Kuo, 2011) and quasi-experimental (Berman et al., 2008; Raanaas et al., 2011) methodologies. Much of the research has not included the direct assessment of the four theoretical constructs (e.g., fascination, extent, being away, and compatibility) of ART and instead researchers seem to accept and test the general presupposition that exposure to nature restores directed attention (Faber Taylor & Kuo, 2009; Tennessen & Cimprich, 1995). Finally, ART includes the specific aspects of wellness related to cognitive function; however, ART theorists have excluded other dimensions of wellness (i.e., emotions) within its conceptualization. In contrast, stress recovery theory (Ulrich, 1983) has been widely researched and found to be a useful construct for researchers to explore the affective responses humans experience when exposed to nature.

Stress recovery theory. Stress recovery theory (SRT; Ulrich, 1983) was developed to explain how nature could serve to reduce stress through eliciting positive affect. In this section, SRT and its underlying constructs are defined and discussed. Stress Reduction Theory assessment and research are explored. Associations between wellness and SRT are then considered.

Definitions. Ulrich (1983) hypothesized that nature prompts unconscious emotional responses within humans, thus bearing a significant influence on physiological response and stress reduction. Three types of nature have been posited to elicit positive affect (Joye & van den Berg, 2011): unthreatening landscapes, vegetative elements, and specific aspects of nature (i.e., a flowing river). Unthreatening landscapes, which are perceived as non-harmful, include views of nature that incorporate a variety of non-

human organisms in their backdrop. The focus of attention is on the whole image or view as opposed to its individual parts. Vegetative elements typically include greenery, such as trees, gardens, and other plants. Lastly, specific types of natural settings include "calm or slowly moving water, verdant vegetation, flowers, savanna-like or park-like properties" (Ulrich, 2008, p. 90, as cited in Joye & van den Berg, 2011). Such nature conceptions have been included both in the research conducted to support the theory and within the key constructs of SRT (Ulrich, 1981, 1983; Ulrich et al., 1991).

Key constructs. Ulrich (1983) believed that humans rapidly recover from stress when positive affective responses result from viewing or being in the presence of unthreatening vegetative elements and natural settings. He argued that present-day positive emotional reactions to nature resulted from our species' evolutionary history. Humans would have been more likely to survive stressful events if such experiences were followed by an immediate extinction of the stress, prompted through the presence of a non-threatening stimulus. Ulrich suggested that positive affective experiences in response to non-threatening nature occur instantaneously, unconsciously, and require minimal cognitive processing. Since much of our human history was spent living in and with nature (i.e., the wilderness), Ulrich (1999) hypothesized that the connection between positive emotions and the experience of stress reduction are limited to natural settings. He wrote:

> For individuals experiencing stress or anxiety, most unthreatening natural views may be more arousal reducing and tend to elicit more positively toned emotional reactions than the vast majority of urban scenes, and hence are more restorative in a psychophysiological sense. (Ulrich, 1983, p. 116)

SRT has accumulated a research base in the past several decades (Ulrich, 1981, 1984; Ulrich et al., 1991), lending some empirical support for Ulrich's (1983) theoretical assertions. Within such studies, researchers have utilized an array of psychophysiological measures to assess the underlying tenets of SRT.

Assessment. To date, researchers have not operationalized SRT through psychometric measures. In studies where psychometric evaluation has been included, researchers have typically utilized questionnaires designed by the study authors (Diette, Lechtzin, Haponik, Devrotes, & Rubin, 2003; Hansmann, Hug, & Seeland, 2007) or instruments designed to assess mood, such as anxiety (Morita et al., 2007). Other researchers have empirically tested SRT using psychophysiological measurement as opposed to or in addition to psychometric instrumentation (Gladwell et al., 2012; Park et al., 2010; Ulrich, 1981). Ulrich (1981) included heart rate, muscle tension, skin conductance, and an indirect measure of systolic blood pressure in researching the stress-reducing qualities of nature. Gladwell et al. (2012) utilized measures of heart rate variability, blood pressure, and respiration in studying the effects of views of nature on the autonomic nervous system. Park and colleagues (2010) measured stress via salivary cortisol, blood pressure, pulse rate, and heart rate variability in studying the bodily effects of walking in a forest environment. Lee, Park, Tsunetsugu, Kagawa, and Miyazaki (2009) also assessed for salivary cortisol and pulse rate, in addition to diastolic blood pressure in exploring the stress-mitigating effects of forest landscapes. Across studies, researchers utilizing psychophysiological measures have found links between natural settings and reductions in stress.

Research. Researchers have utilized psychometric measures in several studies in testing SRT (Diette et al., 2003; Ulrich et al., 1991). In a widely cited study, Ulrich (1984) examined the records of 46 patients who had undergone gall bladder surgery at a hospital over an eight-year span. Half of the sample had a view of a brick wall outside their window during recovery and half of the sample had a view of deciduous trees. Patients who had views of the deciduous trees had significantly shorter hospital stays, took fewer pain medications, and received fewer negative notes from nurses (i.e., the patient was upset or crying). Ulrich concluded that natural views facilitated a greater recovery from surgery than views of the built environment, although he cited that findings could not extend beyond the sample and two environments utilized. In another medical study, Diette et al. (2003) utilized a randomized control trial design in testing whether the presence of a nature mural and sounds helped reduce pain and anxiety in a sample of 80 adult patients during flexible bronchoscopy. Patients were either exposed to the nature mural and sounds or treatment as usual. Patients rated pain control and anxiety on a scale of one to 5, ranging from poor to excellent. The authors found that patients exposed to the nature condition reported significantly less pain and concluded that the integration of nature into situations where patients may be experiencing discomfort or pain might help patients feel more comfortable. The authors cited self-reported patient data among the limitations and suggested that future research utilize physiological measures to determine the mechanism of action in reducing the pain of patients.

Although the research has been limited (Largo-Wight, Chen, Dodd, & Weiler, 2011a; Largo-Wight et al., 2011b), nature has been found to promote stress reduction

when at the office. Largo-Wight et al. (2011a) studied the perceived stress, stress-related behaviors, and stress related health outcomes of workers (N = 503) at a southeastern university in the United States. They utilized the Perceived Stress Questionnaire (Levenstein et al., 1993) and the Nature Contact Questionnaire (NCQ; Largo-Wight, 2011b). The questions on the NCQ surveyed the frequency with which workers spent time outside on breaks, whether participants had live plants in their offices, and whether workers had a view of nature through a window. The researchers found negative associations between contact with nature and stress and negative associations between contact with nature and health complaints. The authors concluded that the more nature people could experience throughout the workday, the greater the health outcomes and lower the stress.

Ulrich et al. (1991) utilized both psychometric and psychophysiological measurement in exploring the effects of ten-minute natural and urban videotapes after participants (N = 120) were presented with a stressor. Participants first watched a worksite accident prevention video (the stressor) and immediately following the ten-minute video, were randomly assigned to one of six video conditions: (a) vegetation, (b) vegetation with a river, (c) high traffic volume on a roadway, (d) less traffic on the roadway, (e) an urban environment with high pedestrian volume, and (f) an urban environment with fewer pedestrians. Various psychophysiological measurements were recorded at baseline and continually monitored during the stressor and watching the video in one of the six environmental conditions. The study authors found that across several of the psychophysiological measures (e.g., pulse, skin conductance, and muscle tension),

recuperation from stress occurred faster when participants were exposed to the natural conditions than the urban settings. Participants also rated greater positive affect in the natural settings following the natural settings conditions. Ulrich et al. concluded that parasympathetic activity was greater when participants were exposed to the nature intervention. In addition, Ulrich and colleagues cited support for SRT given that nature imposed a greater parasympathetic response on the participants than urban settings. They suggested further research needed to be dedicated to the parasympathetic response to varied natural and urban settings since the study only included six settings.

Gladwell et al. (2012) studied whether views of nature (i.e., picture of a tree in a neighborhood or a picture of a tree in a pasture) within a controlled laboratory environment could reduce stress measured through reduced heart rate variability (HRV) as compared with urban scenes (i.e., view of an apartment building). HRV was utilized as a measure of parasympathetic control. Participants (N = 29) viewed both urban and natural scenes and the researchers analyzed significant differences utilizing a within groups design. Although there were not significant differences found between the two conditions in heart rate and blood pressure, results indicated that greater control or increased activity of the parasympathetic nervous system occurred when participants viewed nature images. Gladwell and colleagues suggested that the findings be interpreted with caution since significant differences were not found in heart rate and blood pressure.

Other senses, including hearing and smelling, have also been found to decrease stress. The use of aromatherapy coupled with massage has been found effective in reducing symptoms of stress and improving mood (Buckle, 1993; C. Dunn, Sleep, &

Collett, 1995). Conrad and Adams (2012) conducted an experimental study where they explored the impacts of aromatherapy versus a control group (treatment as usual) in assessing for symptoms of postpartum depression and anxiety in women ($N = 28$). The researchers utilized a repeated measures design, in which they administered the Edinburgh Postnatal Depression Scale (Cox, Holden, & Sagovsky, 1987) and the Generalized Anxiety Disorder Scale (Spitzer, Kroenke, Williams, & Löwe, 2006) at baseline, two weeks, and four weeks. The experimental groups were administered aromatherapy, which included a rose lavender blend of natural scent in 15-minute sessions, two times per week for four weeks. The researchers reported statistically significant ($p < .05$) results, where persons in the aromatherapy group experienced decreases in both depression and anxiety scores, whereas the control conditions did not. The authors concluded that aromatherapy might be effective in reducing symptoms of depression and anxiety. The researchers cited limiting factors to the study as including a non-randomized control group and small sample size.

Nature sounds have also been found to impact aspects of wellness. Alvarsson, Wiens, and Nilsson (2010) studied the stress recovery effects of nature sounds (e.g., a fountain with birds chirping) versus noisy environments (e.g., high or low traffic sounds) with 40 university students following a brief arithmetic exercise. Researchers measured stress recovery via changes in skin conductance and heart rate variability. Alvarsson et al. found that participants recovered from stress significantly faster measured via decreases in skin conductance ($p < .05$) when listening to nature sounds over traffic sounds. The

study authors concluded that nature sounds could induce recovery from stress following activation of the sympathetic nervous system.

Lee et al. (2009) utilized a three-day field experiment in which twelve males were asked to randomly visit forest (i.e., going to and sitting in a forest) and urban environments (i.e., going to and sitting in a commercial urban area) four times per day. All participants visited each site multiple times and spent approximately 15 minutes at each site per visit. Lee and colleagues found significantly lower salivary cortisol (a measure of stress), decreased diastolic blood pressure, and decreased pulse rate in the forest settings. Participants self-reported that they experienced greater comfort and relaxation in the forest environment, which was interpreted as positive affect. Lee et al. cited that both the sample of participants and sampling of the environments were limited, thus inhibiting the generalizations of the findings. The researchers concluded that relative to urban environments, forest landscapes possess the ability to decrease stress and increase positive emotion.

In a larger study, Park et al. (2010) included 280 Japanese male college students in determining whether significant differences existed in physiological and psychological measures of stress. The researchers used 24 forest and city environments where they had participants view and walk throughout the areas. Over two days, participants rated themselves on a zero to four scale using the Profile of Mood States, which includes 30 adjectives (i.e., anxious), to describe their current mood. In addition, an array of physiological measures was taken. The researchers found significantly lower measures of salivary cortisol, pulse rate, blood pressure, and increased parasympathetic nerve activity

when participants were in forest settings relative to being in the city. In general, the participants also experienced less tension, self-reported feelings of depression, and feeling more refreshed after experiencing the forest environments. The authors concluded that *Shinrin-Yoku*, or forest bathing, could be used as a health-effective strategy in preventative medicine.

Across well-controlled studies, natural settings decreased stress in participants. Both self-reported psychological data and psychophysiological data suggested connections between stress recovery and viewing or being in natural settings. Despite these findings, Bowler, Buyung-Ali, Knight, and Pullin (2010) noted that in many studies utilizing psychophysiological measures the effect sizes for cardiovascular (i.e., blood pressure) and endocrine (i.e., salivary cortisol) measurements were low. Hedges *g* ranged from 0.03 to 0.07 for blood pressure and cortisol concentrations across studies, suggesting a small effect of nature on reducing stress levels. The authors concluded that there was little effect on the environmental settings on stress outcomes. Therefore, while evidence has accumulated for the positive physiological effects of nature on stress reduction, more research is needed in this area to determine the level of effect, as well as the extent to which positive wellness outcomes result from exposure to nature.

Orientation to wellness. Ulrich (1983) described SRT to include an explanation of how stress reduction is enhanced through the positive emotions one experiences through connection with nature. Considerable research has been conducted that supports the theory, although it is limited to the wellness dimension of positive emotions. It therefore excludes other dimensions of wellness, just as theorists (R. Kaplan & Kaplan,

1989) of ART included only the cognitive dimension of wellness within their theory. Thus, scholarly inquiry in the area of SRT has yet to explore relationships between wellness, stress reduction, and nature.

Summary. Ulrich (1983) developed SRT to describe how access to nature positively impacts emotions and reduces stress. Although SRT has not been operationalized in the form of a validated psychometric instrument, many researchers have identified links between stress reduction and nature exposure through psychophysiological measurements including heart rate, blood pressure, and salivary cortisol (Lee et al., 2009; Ulrich, 1981). The research published in support of SRT has included some descriptive (Ulrich, 1984) as well as a variety of experimental (Park et al., 2010) designs. Despite the positive relationships found between stress reduction and nature, some scholars (Joye & van den Berg, 2011) have argued that the current empirical evidence that lends support to SRT is inadequate and does not directly provide support for the underlying assumptions of the theory. For example, Ulrich (1983) speculated that positive affect results immediately and unconsciously in the presence of non-threatening nature. Joye and van den Berg (2011) suggested that scientific research does not support the view that positive affect leads to the reduction of stress. In addition, they argued that there lacks an empirical basis for describing SRT as resulting from evolutionary history since such a hypothesis is not testable. Despite these potential limitations, researchers have found links between stress reduction and exposure to nature. Similar to ART (R. Kaplan & Kaplan, 1989), Ulrich's (1983) SRT theory included the specific aspects of wellness related to affect and stress reduction. While both theories have received the most

empirical support out of the nature theories, neither ART nor SRT included a holistic explanation for how nature impacts wellness.

Summary of nature theories. A variety of nature theories have just been explored. Each theory was developed to provide unique explanations for why humans affiliate with nature and how they benefit from being in or viewing nature. The assessment measures for each theory were described, although such assessments have not always been included in the research exploring the theories (Nisbet et al., 2009). The studies cited have included a variety of descriptive and quasi-experimental designs, with most experimental designs being used in support of ART (R. Kaplan & Kaplan, 1989) and SRT (Ulrich, 1983). All nature theories examined have included aspects of wellness (i.e., all-encompassing descriptions of human wellness or specific aspects of wellness). In particular, ecopsychology (Roszak, 1992), biophilia (E. O. Wilson, 1984), and place attachment (Ramkissoon et al., 2012) were described as general theories of nature while ART (R. Kaplan & Kaplan, 1989) and SRT (Ulrich, 1983) were identified as specific theories of nature (i.e., cognition or affect). In general, these theories and their related research have lacked uniformly described conceptions of nature.

A major criticism of nature theories and associated research has been the lack of uniformity in how nature has been conceptualized (Bowler et al., 2010). Nature seems to be described most often by the researcher as opposed to being dictated by theory. For example, in their meta-analysis, Bowler et al. (2010) indicated that out of 25 studies, most researchers broadly operationalized the ‘natural environment’ as community parks and university campuses. Other natural environments cited in studies included wildlife

preserves, “wilderness,” “forests,” and “gardens.” The researchers concluded that such diverse descriptions of nature make it difficult to compare and replicate the results of studies or attribute study findings to one theory in particular. The discussion of what nature is becomes even more complex in the clinical applications of nature theory, where a broad range of counseling approaches have operationalized nature in a variety of ways.

Clinical Applications

A variety of helping strategies and approaches has resulted from nature theory and their associated research. Buzzell and Chalquist (2009) described a diversity of therapeutic approaches taking place in nature as “ecotherapy,” “an umbrella term for nature-based methods of physical and psychological healing” (p. 18). Also referred to as nature assisted therapy (Annerstedt & Währborg, 2011), ecotherapy includes animal-assisted therapy, horticultural therapy, adventure-based and wilderness therapy, among others. In this section, the key features of these helping approaches along with examples of the supporting research are described. The role of clinical assessment is also discussed.

Animal-assisted therapy. Animal-assisted therapy (AAT) is a goal directed intervention aimed at increasing human physical, social, emotional, and cognitive function where an animal (i.e., a dog) is included as a central aspect of the therapy (American Veterinary Medical Association, 2007). Typically, AAT includes a credentialed therapist or other treatment provider guiding the relationship between the person and animal to address goals as delineated within a treatment plan (Chandler, 2005). AAT has included the integration of dogs (Rossetti, DeFabiis, & Belpedio, 2008), horses (Klontz, Bivens, Leinart, & Klontz, 2007), and dolphins (Antonioli & Reveley,

2005) into therapeutic settings such as psychotherapy (Parshall, 2003) and medical settings (Barba, 1995).

AAT has been shown to be an effective intervention for persons presenting with autistic symptomology, medical challenges (i.e., increase fine motor skills), behavioral problems, and emotional disorders (Nimer & Lundahl, 2007). Souter and Miller (2007) conducted a meta-analysis that included five studies to determine whether AAT impacts symptoms of depression. The studies evaluated within the meta-analysis exhibited random assignment, use of a comparison or control group, and enough information to enable the authors to calculate effect sizes. Souter and Miller calculated a random effects weighted mean effect size of .87, which was statistically significant ($z = 4.05$; $p < .05$) and concluded that AAT is effective in reducing symptoms of depression. They recommended that future research encompass rigorous experimental designs and include the use of physiological measures to capture a more holistic measure of depression.

Berget, Ekeberg, Pederson, and Braastad (2011) explored the effects of farm animals during a 12-week intervention aimed at reducing anxiety and depression among psychiatric patients. Researchers utilized a randomized controlled trial that incorporated six-month follow-assessment. The experimental group ($n = 41$) was exposed to farm animals three hours twice per week for 12-weeks in addition to treatment as usual (e.g., individual therapy and medicine management). These participants experienced physical touch with a variety of farm animals and helped with tasks on a farm where farm animals were present. The control group ($n = 28$) received treatment as usual. Berget et al. detected significant reductions in anxiety (using the Spielberger State Anxiety Inventory)

at the six-month follow-up in the experimental condition. Significant reductions in depression were found in both the experimental and control conditions at six-month follow-up, but no significant differences between groups were discovered. Berget and colleagues concluded that AAT in addition to treatment as usual could be effective in reducing anxiety in psychiatric patients. The researchers cited the limitations as the inability to blind experimenters to the treatment conditions and the inclusion of moderate numbers of patients across diagnostic categories.

Pederson et al. (2011) also conducted a study utilizing AAT in the form of farm animals with fourteen adults presenting with clinical depression. Participants spent twice per week for 12 weeks taking part in various tasks on a farm. Researchers video-recorded one session towards the beginning of the intervention and one towards the end. Researchers coded the recordings using continuous time sampling and the researchers categorized the recordings in regard to the work tasks (i.e., technical preparation for milking, fetching feed, mucking), human contact, and animal contact (i.e., milking, feeding, grooming). Participants completed several instruments including the Beck Depression Inventory, the State-Trait Anxiety Inventory-State Subscale, and the Generalized Self-Efficacy Scale at baseline and post-study. Levels of both depression and anxiety decreased and self-efficacy improved during the intervention. Interestingly, mental health was more greatly improved when contact with animals was coupled with a task than contact with animals alone, only when progress on the task at hand was made. The authors stated that the video recordings might not have been representative of the participants' different behaviors given that they were only recorded two out of ten

sessions. In addition, the authors cited the observer effect as potentially impacting how participants engaged in the work tasks. In addition, the high use of correlations in the study did not allow the researchers to determine causal relationships between AAT and improved mood symptomology.

Overall, AAT appears to be an effective approach in addition to treatment as usual for a variety of medical and psychiatric conditions (Nimer & Lundahl, 2007). The available AAT research includes a variety of studies where RCT's were utilized, which have demonstrated the therapeutic qualities of AAT in reducing mood symptoms (Souter & Miller, 2007). Despite the strengths of AAT research, Rossetti and King (2010) cited several potential drawbacks of AAT. Clients or patients may have a fear or specific phobia in regard to different kinds of animals that might be included in therapy. The helpee might also be allergic to animals, thus limiting their therapeutic utility with asthmatic populations. In addition, these authors described the time and monetary cost that it takes to train and prepare an animal. Therefore, where some research has been conducted to demonstrate the therapeutic utility of integrating animals into therapeutic practice, several potential limitations might impact the ability to integrate them into clinical settings. In contrast, horticultural therapy has a number of advantages that make it useful for a broad spectrum of clients.

Horticultural therapy. Horticultural therapy (HT) has been described as the intentional infusion of gardening into therapeutic processes (Söderback, Söderström, & Schälander, 2004). Healing gardens can be indoors or outdoors and include an abundance and variety of plants and flowers. They might also include ponds, sculptures, quiet, and

open spaces. Horowitz (2012) described therapeutic garden characteristics as including scheduled and programmed activities with trained helpers, accessibility to people across the lifespan with varying abilities, well-defined physical spaces, safe conditions, plant dominated spaces, and a unified design. HT has been included in the treatment of a variety of medically related conditions, including Alzheimer's (M. J. Kaplan, 1994), dementia (Jarrott, Kwack, & Relf, 2002), cancer (Fried & Wichrowski, 2008), stress related illnesses (Verra et al., 2012), and in the treatment of mental health disorders, including depression (Gonzalez et al., 2010, 2011).

EuJean, GoWun, JongWon, Sung Eun, and ChunHo (2010) conducted a meta-analysis on 108 research studies where researchers explored the health effects of HT. They found a large effect size (.71), concluding that HT is an effective form of therapy for a variety of illnesses and conditions. They found that HT was most effective with children with special needs and adults who are later in their lifespan (i.e., geriatric patients). They reported that the most effective HT included those incorporating floral decorations and included just over 30 sessions. They cited physical health as the most consistent finding across HT studies, although reported cognitive, emotional, and social impacts of HT as well.

Verra et al. (2012) utilized a non-random quasi-experimental design in determining whether HT in addition to pain management improves mental health, the ability to cope with pain, and physical function. All patients (N = 79) presented with chronic musculoskeletal pain (i.e., fibromyalgia) and took part in a regular regime of drug therapy, exercise, and psychotherapy. The experimental condition (n = 37) also took part

in seven sessions of HT, lasting over the course of four weeks. The HT condition included learning about the health benefits of HT, planting seeds, taking care of plants, and preparing a bouquet of flowers. Researchers assessed pain and mental health utilizing a number of assessments, including the Medical Outcome Study Short From-36, the West Haven-Yale Multidimensional Pain Inventory, the Hospital Anxiety and Depression Scale, and the Coping Strategies Questionnaire. Participants were assessed at entry and discharge from the pain management program. Upon discharge, researchers found that the HT group experienced significantly greater improvements in regard to physical and mental health (i.e., reductions in anxiety, depression anger, fatigue, and confusion) and coping strategies for pain. Verra et al. (2012) described the major study limitation as the recruitment of participants at two different points in time, thus impacting their ability to randomly assign participants to the control and experimental groups. Nonetheless, the study authors suggested that treatment as usual that includes HT might be an effective means to promote mental health and pain reduction in patients presenting with musculoskeletal pain.

Gonzalez and colleagues (Gonzalez et al., 2010, 2011) conducted several studies on the effects of a group format of HT on depression, attentional capacity, and rumination of persons diagnosed with clinical depression. In both research articles, the study authors described a 12-week HT session that included active (i.e., activities such as sowing, planting, rooting and cutting flowers and herbs) and passive (i.e., walking around a farm, sitting on a bench, watching wildlife, and picking flower bouquets) program components. Outcome measures included the Beck Depression Inventory, Attentional Function Index,

Brooding Scale, and Being Away and Fascination subscales of the Perceived Restorativeness Scale. The researchers (Gonzalez et al., 2011) found reductions in depression, increases in attention, and decreases in brooding. The reductions in depression were maintained through the three-month follow-up. These authors concluded that a sense of being away and fascinated serve as integral aspects in HT in reducing depressive symptomology.

Verra et al. (2012) described the state of the science of HT as having few experimental studies supporting the effectiveness of HT. In addition, studies seem to include settings that are diverse, including gardens at or near hospital settings or on farms, which makes it difficult to generalize findings to other settings. Some of the research includes HT with individuals (Verra et al.), while other researchers have included group HT structures (Gonzalez et al., 2011), although group effects were not taken into consideration in the analysis of results. Wilderness therapy, which takes place primarily in natural settings, usually occurs in the context of group formats.

Adventure-based therapy and wilderness therapy. Adventure-based therapy (ABT) comprises an overarching set of outdoor interventions that includes wilderness therapy (WT; Hill, 2007). WT as a form of ABT has been applied with a variety of populations, including at-risk youth (Gillis, Gass, & Russell, 2008) and families (Swank & Daire, 2010). WT typically takes place with small groups and includes therapeutic directives assigned by the facilitator; natural consequences serve as primary change agents in the process of therapy (Beringer, 2004). WT can last a day, a week, or over a month at a time. WT does not explicitly focus on the human-nature connection to restore

wellness, but rather, utilizes nature as a setting in which change is enabled through outdoor activities combined with counseling interventions (Beringer). Although few outcome studies have explored the effectiveness of WT, Hill (2007) noted that outdoor programs might assist in increasing behavioral and interpersonal skills, increasing self-worth, and reducing recidivism among adolescents.

Numerous studies have been conducted to determine the effectiveness of WT. Annerstedt and Währborg (2011) reported the effect sizes of three meta-analyses conducted on wilderness therapy. The average effect sizes were reported as .34, .31, and .18. They concluded that these small effect sizes provided marginal evidence for the effectiveness of WT on measures of wellness, including increases in self-concept, self-confidence, and locus of control. In contrast, S. J. Wilson and Lipsey (2000) calculated an average effect size for 28 studies of .18. This analysis was limited to include only wilderness challenge programs for at-risk and delinquent youth ages 10 to 21. The authors concluded that wilderness therapy programs are somewhat effective in reducing recidivism in at-risk adolescents. In particular, the authors suggested that the more that WT programs included therapeutic elements (i.e., individual, family, or group counseling), the more positive the outcomes. Outcome measures included self-reported recidivism, the enhancement of social skills, locus of control, self-esteem, and school adjustment. S. J. Wilson and Lipsey (2000) described a major limitation of WT research as only including white males and suggested that more research should be inclusive of both genders and other ethnicities.

Gillis et al. (2008) studied the effectiveness of three different adjudicated youth programs for males ages 8 to 18. In a non-randomized study, Gillis et al. compared the effectiveness of three different programs. All participants stayed a minimum of 30 days but no longer than a year. Group one (n = 347) was part of an adventure-based management program that highly valued group process and adventure-based interventions designed to meet the developmental needs of the participants. Group two (n = 347) included outdoor therapeutic camping that incorporated base and residential camping; this condition included activities such as backpacking and a ropes course. The final group (n = 347) included "treatment as usual" where participants experienced a 90-day boot camp experience. Researchers found that at one-year, two-year, and three-year follow-ups participants exposed to the adventure-based management program experienced fewer rearrests when compared to either of the other programs. They reported small to moderate effect sizes in support of their findings. Gillis and colleagues suggested that such significant differences were found because of the adventure-based management program's focus on group process and developmentally appropriate adventure-based activities. These study authors did not report any limitations in their study.

Bettmann and Tucker (2011) studied the effects of a seven-week wilderness program on adolescents' (N = 96) attachment to parents and peers. Researchers utilized three separate measures of attachment in assessing for parental and peer attachment on the first and last day of the program. The seven-week program included group and individual counseling twice a week, daily hiking, fire making, and the preparation of

meals. Participants also received correspondences from parents and parents arrived to be with the adolescents for a two-day wilderness experience at the end of the program. The study authors reported significant decreases in anger towards parents and increases in emotional connection. Bettmann and Tucker (2011) cited a racially homogenous sample (e.g., 90% white) and a pre/post study design as factors limiting the generalizability of the study findings. Bettman and Tucker suggested that future studies include more racially diverse samples to increase generalizability and comprise follow-up assessment to detect changes in attachment over a longer period of time.

WT interventions have been criticized for ignoring environmental influences and the role of nature in the change process (Beringer, 2004; Berger & McLeod, 2006; Fletcher & Hinkle, 2002; Hill, 2007). Beringer (2004) argued for an ecological approach to interpreting WT outcomes. She posited that all human processes occur within the context of relationships, including social and human-nature interactions. Hill (2007) summarized two meta-analyses of WT and concluded that current research neither addresses the specific factors that are therapeutic nor the therapy's long-term outcomes. Outcomes are reported in relation to small convenience samples, inattention to confounding factors, and poor methodology. In addition, non-published studies have been included in meta-analyses. Thus, methodological rigor and quality of studies are in question when it comes to the literature associated with WT.

General ecotherapy. Considerable research has been conducted on AAT, HT, and WT. Several additional approaches to ecotherapy have been described in the multidisciplinary literature. Such ecotherapeutic interventions have been utilized as an

adjunct to traditional mental health services (N. M. Wilson et al., 2008) in community settings or have been developed for use with clients in traditional counseling settings (Berger & McLeod, 2006). Berger and McLeod (2006) defined nature therapy as "a postmodern experiential approach based on the integration of elements from art and drama therapy, Gestalt, narrative, eco-psychology, transpersonal psychology, adventure therapy, shamanism, and body-mind practices" (p. 82). In this framework, nature serves as a key facilitator in the therapeutic process (e.g., building a "home" in nature). This process is reinforced through the use of rituals that support the interdependence among people and nature, and through nature as a metaphor of one's life journey and the counseling process (e.g., sunset/sunrise as it relates to the life-death cycle). Berger and McLeod used physical touch with nature to reconnect clients to the earth, suggesting "nature contains resources that can support emotional, spiritual, mental, and physical personal well-being, which in turn can be used for psychotherapeutic purposes" (p. 91). Nature therapy is thus broadly defined as the integration of nature as a primary change agent in counseling experiences. To date, nature therapy has not received empirical support.

N. M. Wilson et al. (2008) developed a community program called *Branching Out* in the Scotland. The purpose of the program was to provide wellness leisure activities in nature as an adjunct service for clients receiving mental health services elsewhere in the community. Researchers hoped to increase client wellness through contact with nature, including conservation (i.e., picking up litter), bushcraft (i.e., map reading and shelter building) environmental art (i.e., photography), construction (i.e., building a shelter), and

exercise in nature (i.e., a walk). Although several other similar community programs outside the United States have been developed and integrated into communities (Townsend, 2006), few other researchers have published outcomes in peer-reviewed journals.

N. M. Wilson et al. (2008) and N. W. Wilson et al. (2011) explored the effects of *Branching Out* by utilizing a mixed methods approach. They evaluated the effectiveness of their twelve-week ecotherapy program on a variety of individuals receiving mental health services throughout the community ($N = 110$), although presenting concerns and diagnoses were not reported. Groups of six to twelve participants spent three hours per week in ecotherapy for twelve-weeks. Follow-up individual interviews with study volunteers ($n = 28$) and clinician focus groups ($n = 5$; $n = 3$) revealed improvements in perceived well-being, physical health, provision of daily structure and routine, transferable knowledge and skill acquisition, and increased social networking and social skills development (N. M. Wilson et al., 2008). Although mental health improvements were reported, it is possible that factors other than nature, such as group dynamics, may have influenced self-reported and observed changes.

N. W. Wilson et al. (2011) utilized quantitative measures to assess the effectiveness of the *Branching Out* program, utilizing the same sample as N. M. Wilson et al. (2008). They included attendance of the program as the independent variable and measures of mental well-being, health, and physical activity. Results indicated no significant difference between pre and post-program scores with exception to physical activity. Researchers also found that increased program attendance was associated with

higher levels of physical activity. N. W. Wilson and colleagues suggested that a longer-term ecotherapy program might have had a greater impact on wellness. They described limitations as lacking follow-up assessment to determine the longer-term benefits of the ecotherapy program and an inability to determine causality within the study since it was not a controlled experiment.

Nature therapy (Berger & McLeod, 2006) and community programs such as *Branching Out* (Wilson et al., 2011) have received little empirical support. More research is needed to aid researchers and counselors in determining what kinds of individual and community-based nature interventions can be useful with clients. Other ecotherapies, including AAT, WT, and WT have received moderate research support, although more research is needed to determine the clinical utility of integrating nature into counseling settings (Annerstedt & Währborg, 2011). In addition, assessment in the ecotherapies has varied by study and researchers have included an array of physical and mental health measures when assessing wellness outcomes of the ecotherapies.

Assessment in ecotherapy. Assessment within studies where researchers have explored the effects of ecotherapy on various aspects of wellness have typically included self-reported measures of physical and mental health, including a variety of assessments related to depression (Gonzalez et al., 2010; Pederson et al., 2011), anxiety (Berget et al., 2011), and pain (Verra et al., 2012). In the case of WT, some researchers have included observational measurements such as the frequency of rearrests of youth as evidence of effectiveness for their wilderness-based interventions (Gillis et al., 2008). Annerstedt and Währborg (2011) observed that a major limitation of ecotherapy studies was their use of

poorly validated instruments. However, recent studies (Pederson et al.) have incorporated strongly validated instruments, such as the Beck Depression Inventory (A. T. Beck et al., 1961). Interestingly, to date, no empirically-based assessments have been developed for specific use within the context of the ecotherapies.

Summary of Nature, Theory, and Applications

To date, a variety of ecotherapies have been developed outside professional counseling to restore and maintain human wellness through contact with nature. Annerstedt and Währborg (2011) conducted a literature review of three meta-analyses and 35 studies where researchers investigated the effects of ecotherapy on different aspects of wellness. Of the studies, six included "high evidence grade" or randomized control trials and 29 included "low to moderate evidence grade" or non-randomized trials (p. 371). The studies encompassed horticultural therapy, wilderness therapy, and general ecotherapy. In general, Annerstedt and Währborg described the ecotherapies as effective in alleviating some symptoms of schizophrenia, adolescent aggression, depression, post-traumatic stress disorder, and anxiety. They cited several limitations across studies, including small sample sizes, poorly validated instrumentation, no power analyses, and many studies reported only short-term outcomes. Annerstedt and Währborg also argued that many of the studies lacked theoretical underpinnings to explain their results.

Few researchers have examined links between specific aspects of wellness and the theoretical tenets of nature theories. Buzzell and Chalquist (2009) described ecopsychology as a major theoretical driving force of the ecotherapies although it has not been determined how nature in therapy impacts the ecological unconscious. Some

proponents of AAT have utilized biophilia to contextualize their findings related to improvements in mental health, but results have been described only in general support of the theory and not in relation to specific components (O'Haire, 2010). In addition, researchers who have found positive relationships between HT and mental health have based their findings in ART, and few have found links between nature and several of ART's core tenets (Gonzalez et al., 2010, 2011). Lastly, the positive outcomes of WT programming have primarily been attributed to the overcoming of cognitive dissonance, group effects, the novelty of a new setting, and developing a sense of mastery or control over one's environment (Hill, 2007). In some ways, natural settings are viewed as a backdrop as opposed to a key facilitator in the change process of WT. Thus, further research is needed on how the specific tenets of nature theories are impacted through the various ecotherapies. Furthermore, just as nature was conceptualized in a variety of ways in the different theories of nature, researchers who support the various ecotherapies have conceptualized nature in a variety of ways. Within the ecotherapies reviewed earlier, nature has been described as animals, gardens, group interactions in wilderness settings, and the intentional use of green settings in the restoration and maintenance of human wellness. Such diverse conceptions of nature make for a complex and unstable construct to be studied and assessed in both research and clinical settings. More research is needed where unified conceptions of nature are incorporated to aid in replication across studies and assist in the clinical applications of nature into therapeutic processes. One promising area for exploration lies in holistic wellness models, which provide both integrated

theoretical models of human functioning, valid and reliable assessment measures, and empirical support for clinical practice.

Wellness Models

Relatively few academicians and practitioners in professional counseling have written about the integration of nature into counseling (Glass & Myers, 2001; Reese & Myers, 2012; Sackett, 2010). Most of the research in this area comes from related disciplines, and specific aspects of health, such as physical or emotional health, have been the primary variables of interest. These health components are incorporated in various degrees in holistic wellness models arising from multiple disciplines, including professional counseling, hence the potential for integration of nature as a component of holistic wellness seems logical if not necessary. To explore the extent of this integration, or lack thereof, definitions of wellness are reviewed, followed by a discussion of wellness models both external to and within professional counseling, including key constructs, associated research, and related assessments.

Wellness Definitions

The evolution of the wellness construct in the United States has involved a variety of beliefs and practices over the past 150 years. William James (1902) wrote about the mind-cure movement, in which he described a commonly held belief that physical health results in large part from one's mental and spiritual health. Horace Fletcher identified with James' conception, but also believed in a broader definition of wellness, which included positive thinking. He alleged that by thinking positively, one could facilitate the development of positive changes in behavior and inevitably lead to improvements in

mental, spiritual, and physical health (Whorton, 1982). Combining these perspectives, Kellogg (1932) later developed the notion of biologic living, a strict wellness regimen of exercise, fresh air, a diet high in fiber and low in fat, low in sex and masturbation, and abstinence from alcohol and caffeine. He believed that if one could stick with such a lifestyle, a person would lack disease and enjoy life to the fullest. These early conceptions and practices of wellness all had in common the goal of living proactively to maximize one's life, prevent disease, and prolong life. Beginning in the 1950's, a number of authors in the health professions began writing extensively about and expanding various conceptualizations of wellness (Ardell, 1977; H. Dunn, 1961; Hettler, 1984; Travis, 1972).

The World Health Organization (WHO; 1946) began working toward a conceptualization of wellness when they defined health as "a state of complete mental, physical, and social well-being, and not merely the absence of disease or infirmity" (p. 1315). Optimal living is the primary emphasis in this definition, signifying a shift away from an earlier emphasis on the treatment of pathology. While this definition was written to include several aspects of wellness, it implied that the individual's level of wellness is a steady state and that wellness included the summation of distinct components of health. Shortly after the WHO published their definition of health, wellness theorists began recognizing the holistic nature of individuals in place of a summative perspective (Orberteuffer, 1953). Often considered an early pioneer in the wellness movement, H. Dunn (1961) defined high level wellness as

> an integrated method of functioning which is oriented toward maximizing the potential of which the individual is capable. It requires that the individual maintain a continuum of balance and purposeful direction within the environment where he is functioning. (p. 4)

Such a definition assumes several inherent qualities of humans. Similar to Maslow's (1943) belief that humans have the potential to self-actualize, H. Dunn believed that inherent in people is unfilled potential and in order to reach one's potential, all aspects of health must be integrated to function at a high level. The individual is capable of developing an individualized sense of balance and create purpose for his or herself in reaching the highest potential. Ardell (1984) built upon H. Dunn's concept of wellness insofar as he believed people could choose to create a lifestyle involving a personalized strategy of wellness. He viewed a wellness lifestyle as dynamic and evolving throughout one's lifespan, shifting with developmental needs. As the individual grew older and experienced different life situations, his or her wellness needs would change, thereby causing the person to adjust the lifestyle plan.

In an expansion of these definitions, Hettler (1980) believed wellness was the integration of specific aspects of health including physical, emotional, occupational, spiritual, intellectual, and social wellness. He defined wellness as "an active process through which people become aware of, and make choices towards, a more successful existence" (p. 77). Like H. Dunn (1961) and Ardell (1984), Hettler hypothesized that wellness was a process whereby people traversed life gaining greater awareness about their own health needs and learning how to integrate them to become optimally well. Only through the active integration and balance of each component of wellness could one

live an optimum existence. With a certain level of ambiguity within the terms successful and optimal, the WHO built upon these definitions of wellness and added greater specificity to the notion of successful existence by observing that wellness is

> the realization of the fullest potential of an individual physically, psychologically, socially, spiritually and economically, and the fulfillment of one's role expectations in the family, community, place of worship, workplace and other settings. (B. Smith, Tang, & Nutbeam, 2006, p. 5)

Within this conceptualization, wellness is viewed as the successful integration of an individual's core health aspects and accomplishing one's role expectations in each of the settings in which he or she interacts. Thus, wellness has evolved from being a simple concept focused on physical wellness, to the integration of one's health components and lifestyle choices.

Several different conceptualizations of wellness have also been introduced within the field of professional counseling. Crose, Nicholas, Gobble, and Frank (1992) conceptualized wellness from a multidimensional systems perspective in which they expanded upon Hettler's (1984) definition. They further described wellness as including multiple dimensions of health, being variable over time and within and between the different dimensions of the individual. That is, each individual carries numerous identities and it is through these identities that one can experience varying levels of wellness. Through counseling, individuals can merge their identities and experience unified wellness. In a similar vein, Meyer and Ponton (2006) utilized a metaphor of a tree in describing the wellness of counselors. They described the many different roles (or

identities) counselors carry and they conceptualized how counselors might promote a high level of wellness in their own lives. They contended that in order for counselor's to maintain wellness, they must find balance between personal and professional activities, ground themselves in supportive and challenging professional and personal relationships, and find roots in both counseling theory and personal spirituality. In order to be healthy the individual must find a balance between work and play, take part in mutual and meaningful relationships, and act in accordance to their core values and beliefs.

A more encompassing definition of wellness in counseling, which has integrated previous conceptualizations of wellness, was presented by Myers et al. (2000). They defined wellness as

> a way of life oriented toward optimal health and well-being, in which body, mind, and spirit are integrated by the individual to live life more fully within the human and natural community. Ideally, it is the optimum state of health and well-being that each individual is capable of achieving. (p. 252)

Myers and Sweeney's definition of wellness incorporated many facets of the other wellness definitions presented. Each aspect of the human entity is integrated within this definition and implied is the notion that if just one facet of human health is negatively or positively influenced, so too are the other aspects of the individual. That is, wellness is the integration of all components of health and optimum wellness requires awareness and commitment to one's short and long-term lifestyle choices (Ardell, 1984; Hettler, 1980). Wellness is also a way of life, thus indicating that it is both a state and a process (H. Dunn, 1961; Myers et al., 2000) whereby an individual moves toward optimum living.

Summary. The wellness definitions just delineated include themes of intentional lifestyles focused on optimal living. Such definitions have contributed to the development of several wellness models in several different fields. Each wellness model provides greater depth and understanding of the wellness construct, yet some models may be more useful than others when considering how nature contributes to holistic wellness.

Interdisciplinary Wellness Models

Three models of wellness (Ardell, 1977; Hettler, 1984; Travis, 1972) within the health professions have materialized from these early wellness definitions. Although similar, each model provides a unique contribution to the wellness literature. Such models have served as foundation to the wellness models developed in professional counseling. Their key constructs, assessments, and research are explored.

Travis and Ryan's conceptualization of wellness. Travis (1972), a medical doctor and health educator, developed the illness/wellness continuum. At the center of the continuum, a "neutral point" is depicted, where no illness or wellness exists (i.e., the absence of disease equates to health); at one extreme point the "treatment paradigm" represents various signs of illness, treated by a medical model that ultimately leads to premature death; and at the other extreme of the continuum, a person gains awareness of health and wellness through education. Growth occurs and healthy lifestyles are established as one moves towards "high-level wellness."

Within the wellness-illness continuum, Travis and Ryan (2004) described an iceberg analogy with four layers. The top and visible portion of the iceberg (the first layer) only subsumes one's current state of wellness. The remaining majority of the

iceberg, ranked as a matter of importance as one goes deeper, includes lifestyle/behavioral health (the second layer), the cultural/psychological/motivational level (the third layer), and the spiritual/being/meaning realm (the fourth layer). The third layer includes cultural influences, environmental influences, and psychological motivations underlying why individuals behave in the ways they do. Travis (1972) did not fully articulate the role "environment" plays in wellness or what environment includes. In addition, Travis's model of wellness lacks empirical support or the use of an empirically developed assessment.

Hettler's Hexagon Model of Wellness. Hettler developed a hexagon model of wellness (Hettler, 1980, 1984) that incorporated physical, emotional, occupational, spiritual, intellectual, and social wellness. He described the six components as interdependent, hypothesizing that changes in one aspect of wellness prompted changes in other areas. The physical dimension of wellness comprises exercise, nutrition, and self-care. The occupational dimension of wellness includes the notion of congruency between one's work, values, and abilities, thus leading an individual to feel satisfied with his or her work life. Similarly, spirituality is conceptualized as living a life that matches an individual's values and incorporates existential pursuit. Emotional wellness is the ability to use emotions effectively across situations while also having the potential to fully experience and manage one's emotions. Hettler (1980) believed that social wellness includes symbiotic relationships within the human and natural community; however, he did not describe how nature impacts wellness.

To date, several assessments have been developed to operationalize Hettler's hexagon model, although most have not been empirically validated. Stewart, Rowe, and LaLance (2000) reported the reliability and validity of a high school version of the Testwell (The National Wellness Institute [NWI], 1994) utilizing a sample of 437 high school students. Some students did not participate in a 12-week wellness curriculum (n = 110) while the remainder of the sample (n = 327) did. The study authors reported Cronbach's alphas for the subscales that ranged between .67 and .89. They reported these reliabilities as low, suggesting that they were marginally acceptable given the large number of items included in each subscale. The NWI (1983) developed the Lifestyle Assessment Questionnaire (LAQ), which was found to include a two-factor structure, Cognitive Wellness and Behavioral Wellness. Palombi (1992) reported the internal consistency of the LAQ as .93, but other researchers have found weak relationships between physiological measures (i.e. body fat) and LAQ scores (DeStefano & Richardson, 1992), thus suggesting that perceived physical wellness does not parallel physiological measures of physical health.

To date, the hexagon model of wellness has not been supported by research and is in need of further empirical investigation and support. Hettler's model has been characterized as being less applicable within the mental health field and focusing more on physical health (Myers & Sweeney, 2008). Further, Hettler included nature in his description of social wellness but did not describe how nature promotes wellness. Ardell's (1977) model of wellness overlaps with Hettler's hexagon model in many ways and provides additional understanding of the wellness construct.

Ardell's Model of Wellness. Donald Ardell (1977) developed a five-dimension circle of wellness. He placed self-responsibility at the core of the circle, as he believed that it was most important in determining one's level of perceived wellness. The other hypothesized aspects of wellness included physical fitness, stress management, environmental sensitivity, and nutritional awareness. Physical fitness is having an exercise routine that is reliable and consisting of related activities. Stress management includes the ability to overcome and maximize life experiences in the face of stress. Nutritional awareness is being able to keep attuned to what one eats, including both quantity and quality. Environmental sensitivity is the interaction between physical, social, and personal factors to gain a perspective that all such things are reciprocal and interconnected. In explaining environmental sensitivity, Ardell articulated that humans should use caution in how they impact nature, but he did not define nature or go into detail on how to maximize individual wellness in natural settings.

In more recent renditions of his wellness models, Ardell (1982) added relationship dynamics and emotional intelligence dimensions and removed environmental sensitivity. However, to date, none of Ardell's wellness models have been empirically evaluated. His primary focus, consistent with many wellness theorists, has been to encourage use of his models for individuals wishing to enhance their wellness as opposed to rigorously testing the hypothesized relationships between the various dimensions of wellness (Myers & Sweeney, 2005a).

Summary. Several holistic models of wellness have been developed in the helping professions (Ardell, 1977; Hettler, 1984; Travis, 1972). While presented as

holistic, in practice the emphasis in using those models has been on physical aspects of human functioning. In addition, limited research has been conducted in support of these models and the conceptualizations of nature within them have not been fully explained or explored. In contrast, wellness models based in counseling emphasize all aspects of human functioning and include contextual considerations and hence the possibility of nature being integrated into these models merits exploration (Myers & Sweeney, 2005a; Sweeney & Witmer, 1991).

Wellness Models in Professional Counseling

Professional counseling is distinguished from the other helping professions in its clear focus on holistic wellness (Myers, 1991; Rollins, 2010). The abovementioned wellness models have been vital in the development of the wellness models in professional counseling (Myers & Sweeney, 2005a), but the associated research and assessment practices are limited, which has challenged counselors in the integration of wellness into research and counseling practice. Two models of wellness have emerged within the field of professional counseling, both based in individual psychology (Adler, 1954), one theoretical in nature and one empirically derived. Adler emphasized the significance of holism in human health, hypothesizing that the individual can only be well if the various aspects of his or her internal and external systems are in sync. If one element of wellness in or outside of the person is impacted, so too is the rest of the individual. The key constructs, research, and assessments of two wellness models in professional counseling are presented.

Wheel of wellness. The development of the Wheel of Wellness (Sweeny & Witmer, 1991; Witmer & Sweeney, 1992) coincided with Myers' (1991) assertion that professional counseling was a distinct profession embedded in wellness philosophy. It was developed utilizing Adlerian Individual Psychology as a way to organize empirical findings identified through cross-disciplinary literature as correlates of health, quality of life, and longevity (Sweeney & Witmer, 1991; Witmer & Sweeney, 1992). The model includes 17 components of wellness organized in a theoretical circumplex model.

***Key constructs*.** Sweeney and Witmer surveyed a breadth of multidisciplinary research and theory, including human development, behavioral medicine, clinical psychology, and personality psychology in developing the original wheel model (Myers et al., 2000). Adler's five life tasks, including spirituality, self-regulation, work and leisure, friendship, and love, connect all the parts of the wheel. Spirituality (life task one) lies at the center (or hub) of the wheel, suggesting that all other aspects of wellness originate from one's experience of spirituality. Spirituality is the awareness one has of there being a force or being transcending visible components of one's existence, providing a sense of connectedness with all that exists (Myers et al., 2000).

Self-direction (life task two), the ability to set and accomplish short and long-term goals, is the second life task in the Wheel (Myers et al., 2000). It includes the intentional and mindful process of realizing one's objectives, which results in a sense of well-being. Although the original wheel incorporated only seven dimensions of wellness, the integration of additional literature in the late 1990s resulted in a revision of this construct to include twelve dimensions and a reconceptualization and renaming of life task two as

self-regulation (Myers et al.). The “spokes of the wheel” include exercise, nutrition, sense of humor, problem solving and creativity, emotional awareness and coping, realistic beliefs, sense of control, sense of worth, cultural identity, gender identity, stress management, and self-care.

The spokes of self-regulation connect life task two with life task three, four, and five (the outer part of the wheel): work and leisure, friendship, and love. Work and leisurely pursuits provide opportunities for intrinsic achievement and fulfillment aligned with our beliefs and values. Friendship includes all aspects of one’s social relationships with others, and incorporates concepts such as empathy, mutuality, and altruism. Such a notion was grounded in Adler’s (1954) conception of social interest, the innate desire to connect with and have others connect with us in meaningful ways. Love is the perception of feeling loved and being able to love others. Love includes the concepts of sustained and mutual commitment and intimacy. Life forces resided on the outermost edge of the wheel and include education, media, community, family, business and industry, government, and community. Contextual factors (e.g., Global events) are assumed to impact one’s holistic wellness, including nature, although nature is not explicitly defined or discussed within the model. When all components of the wheel are functioning they work together in unison, thus allowing the wheel to function ideally (e.g., optimal wellness). However, if one aspect of wellness (i.e., a spoke) is impacted, then all other areas are also impacted, thus affecting the functionality of the wheel (Myers & Sweeney, 2005a).

***Assessment and research*.** Myers, Sweeney, and Witmer (1996) developed the Wellness Evaluation of Lifestyle (WEL) inventory, which included 123 attitudinal statements (e.g., "I value myself as a unique person"). Respondents rate themselves using a four point Likert-type scale ranging from strongly agree, agree, disagree, and strongly disagree. Mean item ratings for each scale are computed and modified using a linear transformation to make the scales comparable with each having a range from 20 to 100. The authors posited that the scale assessed the five life tasks as described within the Wheel of Wellness.

After collecting data for seven years using the WEL, Hattie, Myers, and Sweeney (2004) conducted a factor analysis based on 5,380 respondents. The resulting structural equation model failed to support the hypothesized Wheel of Wellness as an explanation of the relationships among the components of wellness (Myers & Sweeney, 2008). In seeking to explain the relationships that emerged from the model, a new, evidence-based model of wellness was defined, which they called the Indivisible Self (Myers & Sweeney, 2005a).

Indivisible self model of wellness. Utilizing structural equation modeling, Hattie et al. (2004) found a different factor structure than what had been hypothesized in the Wheel of Wellness. This led to the development of an evidence-based model of wellness in counseling, the Indivisible Self Model of Wellness (IS-Wel; Myers & Sweeney, 2005a). Myers and Sweeney grounded the model in Adlerian theory, with the Self as the core and indivisible component of wellness. Five second-order factors also surfaced: the Coping Self, Creative Self, Essential Self, Physical Self, and the Social Self.

***Key constructs*.** Each of the original 17 components of the Wheel of Wellness appear as third-order factors within the IS-Wel, which are grouped within the five second-order factors. The Coping Self allows the individual to survive and thrive through difficult life circumstances and includes leisure, self-worth, stress management, and realistic beliefs. The Creative Self includes the third order factors of thinking, emotions, control, work, and positive humor. It is the unique combination of individual characteristics that enables each of us to create an inimitable space with others. The Social Self is the perception of social support through friendship, family relationships, and love relationships. It includes two of Adler's life tasks, love and friendship. The Essential Self incorporates the lenses through which one makes meaning out of life experiences. It comprises the third order factors of spirituality, gender identity, cultural identity, and self-care. The Physical Self is defined as the biological and physiological processes that assist an individual in experiencing physical health. It includes the third order factors of exercise and nutrition.

Although they have not been empirically validated, the model also includes contextual variables that include local, institutional, global, and chronometrical variables. Similar to Bronfenbrenner's (1979) position that the individual both impacts and is impacted by the world around him or her, the authors of the IS-Wel held a similar view. The local context includes interactions between the individual and the systems in which he or she is exposed (e.g., family, neighborhood, school, etc.). Institutional contexts (including education, religion, government, etc.) were viewed as having both direct and indirect effects on the individual's life. Global contexts such as war, famine, and

degradation of the environment also are believed to impact holistic wellness. Finally, the chronometrical context refers that the notion that people will change over time in ways that can be both predicted and unpredicted. Despite the authors' efforts in describing the model as ecological, an explicit focus on how one's connection with nature impacts wellness was not addressed.

Assessment and research. The Five-Factor Wellness Inventory (5F-Wel) was developed to assess the factors included in the IS-Wel (Myers & Sweeney, 2005a). The 5F-Wel is an evidence-based measure grounded in Adlerian individual psychology, emphasizing the indivisibility of the self, or what Adler called holism (Ansbacher & Ansbacher, 1956) based on a single, higher order wellness factor including all aspects of wellness. It includes 73 attitudinal and behavioral statements (e.g., "I am an active person") which respondents rate using a four-point Likert-type scale ranging from strongly agree, agree, disagree, and strongly disagree. Mean item ratings for each scale are computed and modified using a linear transformation to make the scales comparable with each having a range from 25 to 100. Reliabilities for the scales were reported by Myers and Sweeney (2005b) as follows: Total Wellness, .98, Creative Self, .96, Coping Self, .89, Social Self, .96, Essential Self, .95, and Physical Self, .90. Cronbach's alphas for the 17 third order factors ranged from .82 to .95, excluding realistic beliefs, which was reported as .58. The second order factors loaded onto the single wellness factor with standardized coefficients spanning .51 to .98. The third order factors loaded onto the second order factors with standardized loadings ranging from .35 to .91. Eigenvalues for the first and second order factors included the following: Total Wellness, 3.16, Creative

Self, 2.95, Coping Self, 2.00, Social Self, 1.35, Essential Self, 1.72, and Physical Self, 1.07. The single wellness factor, the Indivisible Self, accounted for a 63% of the variance within the model.

The WEL and 5F-Wel have been widely studied, used in large part as dependent or outcome variables (Myers & Sweeney, 2008). In particular, the 5F-Wel has been utilized in studying the wellness of children and adolescents (Myers et al., 2011), undergraduate students (Myers & Mobley, 2004), counselors, counselor educators, and counselors in training (Hartwig Moorhead et al., 2012), and used as an outcome measure in program assessment (Villalba & Myers, 2008).

Tatar and Myers (2010) explored differences in perceived wellness between middle school students in Israel and the United States. Participants included 629 middle school students from the United States and 240 middle school students from Israel with ages ranging between 12 and 18. Students were administered the 5F-Wel-Teen version, which has been found to have moderate to high internal consistency on each of the five second-order factors, with Cronbach's alpha's ranging between .75–.88 (Myers & Sweeney, 2005b). Tatar and Myers found significant differences between participants from the two different countries on three different second-order factors. Israeli students scored higher on both the Coping and Social second-order factors while Americans scored higher on the Essential Self. They attributed these findings to relative differences in cultural values between either of the countries. The authors concluded that cultural values play a primary role in the experience of perceived wellness. They reported the

study limitations as lacking random assignment and therefore generalizability, as well as having the inability to determine the cause for the differences in wellness factors.

Watson and Lemon (2011) investigated the wellness profiles of 114 adolescents ages 12 to 19 receiving mental health services from a community organization and compared them with a norm group of similarly aged persons (n = 1,142). Watson and Lemon utilized the 5F-Wel-Teen version in their study. They reported Cronbach's alphas as .93 for overall wellness and the internal consistencies ranged from .83 to .91 for the five second-order factors. The researchers found significant ($p < .05$) differences in the wellness profiles of those adolescents receiving mental health services and those within the norm group. Of notable interest, the researchers reported lower overall wellness and lower second-order factor scores than the normed group. In addition, participants receiving mental health services reported lower gender and cultural identities than adolescents within the norm group. The researchers concluded that adolescents seeking mental health services are less well than persons who did not seek mental health services. They cited the study limitations as limited generalizability on account of a small convenience sample.

McDonald (2011) conducted research using the 5F-Wel with transcultural persons (N = 289), individuals who have spent much of their lives living in more than one country. The study included persons ages 18 to 67, 80.3% Caucasian, and 77.5% female. The author noted that much of the previous research had indicated that transcultural persons faced many more obstacles than non-transcultural individuals and thus expected transcultural participants to score lower on the 5F-Wel than the normative sample, which

included 1,899 volunteer participants reported in the 5F-Wel manual (Myers & Sweeney, 2005b). Unexpectedly, transcultural participants scored significantly higher on overall wellness ($p < .001$) and on all other second and third-order factors ($p < .05$). McDonald also reported a large effect size ($d = .85$) between the transcultural and normative groups in overall wellness scores. McDonald concluded that transcultural persons might be more well than previously thought. The author did not cite study limitations.

Gibson and Myers (2006) explored relationships between wellness, stress, and mattering among Citadel cadets, a study that replicated an earlier study conducted by Myers and Bechtel (2004) with first-year cadets at West Point. The study sample included 234 cadets. They were administered the 5F-Wel, the General Mattering Scale, (GMS; Marcus, 1991), and the Perceived Stress Scale (PSS; Cohen et al., 1983). Researchers found a negative, significant correlation between Nutrition and Perceived Stress ($r = -.229$, $p < .002$) and a significant positive correlation between Exercise and Perceived Stress ($r = .141$, $p < .002$). Overall wellness and mattering were also significantly correlated (.394, $p < .002$). The study authors recommended that having a small sample size and relatively few females and ethnic minorities limited the generalizability of the findings. Socially desirable responding and geographic location of military training were also cited as potential limitations to the study's findings.

Summary of Wellness Models

The Wheel of Wellness and IS-Wel have been widely written about and studied. They are distinguished from wellness models in helping professions other than counseling in their explicit focus on holism and encompassing all aspects of human

health, whereas models in the health sciences, though presented as holistic, in practice have had a much narrower focus on physical health (e.g., Hettler's hexagon model). Abundant descriptive and correlational research has been conducted in the field utilizing the 5F-Wel (Myers & Sweeney, 2005b), which has high internal consistency and is a widely accepted instrument in the field. This instrument is underutilized in clinical settings and only a few outcome studies exist (Villalba & Myers, 2008).

Wellness models in professional counseling have previously been described as ecological (Myers & Sweeney, 2008), and Myers et al. (2000) included the "natural community" in conceptualization (p. 252). However, it is currently unknown where nature fits within these holistic models. Researchers and practitioners lack empirical knowledge about the benefits of integrating nature into wellness counseling as, to date, such relationships have not been studied. Unified nature conceptualizations and empirical means to assess nature and wellness are lacking, consequently we may be underutilizing an important aspect of human wellness in work with clients.

EcoWellness: The Missing Factor in Holistic Wellness Models

A variety of nature conceptualizations, nature theories, nature therapies, wellness definitions, and wellness models have been reported and evaluated. The review of the literature has revealed a lack of explicit connections between conceptions of holistic wellness and nature in the multidisciplinary wellness models. Following an integrated review of the literature, Reese and Myers (2012) developed the construct of EcoWellness to initiate the study of nature and holistic wellness in the field. They defined EcoWellness as "a sense of appreciation, respect for, and awe of nature that results in feelings of

connectedness with the natural environment and the enhancement of holistic wellness" (p. 400). In this section, the proposed dimensions of EcoWellness are defined and associated theory and research are integrated. Current assessment practices of EcoWellness are discussed, and the need for a reliable and valid measure for use in counseling is examined.

Dimensions of EcoWellness

EcoWellness was developed in the context of nature theory and experimental and descriptive research between nature constructs and indicators of wellness. Reese and Myers (2012) proposed three dimensions of EcoWellness: access, environmental identity, and transcendence, although the dimensions and the nature construct were not fully defined. Based on the literature cited earlier, the initial definitions of these three dimensions have been expanded and subcomponents have been identified.

Access. Reese and Myers (2012) emphasized that having access to nature is vital to several aspects of human wellness. The more people have access to nature, the better they behave, feel, and think. The dimension of access can be conceptualized as including the ability to physically be in nature (i.e., physical access) and accessing aspects of nature with one's senses even when one is not in or with nature (i.e., sensory access). A variety of research and theory lends support to the access dimension. Key elements of research are included below to underscore the importance of each dimension.

Physical access. Physical access is broken down into two specific components. They include:

1. living, working, socializing, or recreating in (or with) places and species that the individual considers nature; and
2. the ability to physically access nature at one's discretion.

Access to nature during recreational activity and work has been shown to improve facets of perceived wellness. Barton, Griffin, and Pretty (2012) compared several recreational activities (i.e., nature walks, playing bingo, and swimming) in adults presenting with mood disorders. They noted improvements in mood and self-esteem at the end of a weekly four-week nature walking intervention when compared with the other conditions. Largo-Wight et al. (2011a) found that access to nature at work promoted increased reported health outcomes when at the office. The researchers found negative associations between contact with nature and stress and negative associations between contact with nature and health complaints. The more nature people could experience throughout the workday, the greater the health outcomes and lower their stress.

The studies cited earlier supported the finding that persons who have physical access to nature in day-to-day living (i.e., at their own discretion) are typically healthier on a number of measures. Reese and Myers (2012) cited research related to the effects of nature exposure on reducing aggression and violence in adult populations (Kuo & Sullivan, 2001a, 2001b), increasing self-control and decreasing stress in children (Faber Taylor et al., 2002), and increasing attention capacity in children (Wells, 2000). Across studies, more experiences with nature correlated with a greater capacity in children for attention, self-control, and the ability to mitigate stress, and better social relationships for

adults. Therefore, when people are able to access nature at their discretion, they are able to be healthier both internally and interpersonally.

The wellness findings of physical access are not only limited to green settings. Physical access with animals has also been shown to assist individuals with a range of medical and mental health concerns, suggesting that having physical access to pets or other animals might promote everyday health. For example, exposure to farm animals reduces anxiety among psychiatric patients and decreases depression and anxiety while promoting self-efficacy in adults presenting with clinical depression (Berget et al., 2011; Pederson et al., 2011). Whether it be in one's typical environment or away from one's typical setting, having safe, regular direct access to nature, can promote several aspects of wellness.

Sensory access. Sensory access is feeling a sense of closeness to nature through one's senses, even when lacking immediate physical access. It includes accessing aspects of nature through one's sense of touch, smell, sight, or hearing. Empirical support for sensory access comes through quantitative studies in which researchers have found positive links between the human senses and wellness.

Aromatherapy (e.g., the use of plants to assist in relaxation) has been found to be effective across a number of indicators of wellness. For example, the use of aromatherapy has been found effective in reducing symptoms of stress and improving mood (Buckle, 1993). Exposure to natural scents (i.e., lavender) for as little as 15-minutes a day just twice per week has been found to decrease symptoms of both depression and anxiety (Conrad & Adams, 2012).

A growing area of research interest includes the use of nature sounds to restore different measures of stress. Although the research in this area has been sparse, some researchers have pointed towards the effectiveness of nature sounds on stress recovery (Alvarsson et al., 2010). Alvarsson et al. (2010) found that participants recovered from stress significantly faster measured via decreases in skin conductance ($p < .05$) when listening to nature sounds over traffic sounds. The study authors concluded that nature sounds could induce recovery from stress following activation of the sympathetic nervous system.

Visual access to nature (i.e., view of a garden or lawn space) on a plasma television screen has also been linked to decreases in stress (Kahn et al., 2008) and views of nature out of a window have been found to reduce the time it takes to recover from some surgeries (Ulrich, 1984). Tennessen and Cimprich (1995) found that undergraduate students who had a view of nature (i.e., trees) from their dorm room performed significantly better than persons without views of nature on the attentional tasks. In addition, Berman et al. (2008) found that viewing natural images improved directed attention abilities. Thus, having a view of nature seems to improve aspects of physical, emotional, and cognitive aspects of wellness.

Touch with animals and plants have also been found to be effective with alleviating symptoms of mood disorders. For example, physical contact with dolphins has been found to decrease symptoms of depression (Antonioli & Reveley, 2005). Contact with plants (i.e., horticultural therapy) has been shown to be effective in positively

impacting stress-related illnesses (Verra et al., 2012) and in the treatment of mental health disorders, including depression (Gonzalez et al., 2010, 2011).

A variety of research has been cited providing support to the proposed dimensions of physical and sensory access. Individuals who have physical access to nature at home (Kuo & Sullivan, 2001a) at work (Largo-Wight et al., 2011a), during recreation (Barton et al., 2012), and other areas of life experience greater wellness outcomes and less stress than persons who do not have physical access. People who are able to access nature through the senses, such as through sight (Kahn et al., 2008), smell (Conrad & Adams, 2012), touch (Antonioli & Reveley, 2005; Verra et al., 2012), or hearing (Alvarsson et al., 2010), even when not physically in a natural setting, also experience different aspects of wellness. Still, whether one chooses to access nature, physically or through their senses, may be explained at least in part by environmental identity.

Environmental identity. In the EcoWellness construct, environmental identity is the extent to which the individual incorporates nature into his or her self-concept and lifestyle (Reese & Myers, 2012). Although only briefly conceptualized by Reese and Myers, close inspection of the interdisciplinary research suggests that environmental identity includes the sub-dimensions of connection, protection, and preservation. Each subcomponent may be discretely defined, and each includes specific connections with nature.

***Connection*.** Connection is the integration of nature into one's self-definition and includes experiencing positive thoughts and feelings when considering one's unique connections with nature. Connection includes the following components:

1. experiencing pleasant cognitions (including memories) while reflecting on one's relationship with nature;
2. having positive emotions while reflecting on one's association with nature;
3. having a special place (or places) in nature that elicit(s) positive emotions and cognitions;
4. and having at least one activity in or with nature that one incorporates into a self-definition.

The sub-dimension of connection is linked with experiences (i.e., memories) in nature that took place earlier in one's lifespan (Wells & Lekies, 2006). For example, persons who describe themselves as having connections with nature often depict themselves as having positive relationships with nature as children. Time spent in nature prior to age 11 increased the adoption of pro-environmental beliefs among adults, possibly because time spent in nature as a child influences the development of a self-concept incorporating nature. Reflecting on one's earlier experiences in nature, then, might promote connection and perceived wellness.

In addition, the more a person feels connected to nature, the more positive emotions are reported (Mayer & Frantz, 2004). Persons closely connected with nature tend to rate themselves higher on well-being scales that include autonomy, personal growth, purpose in life, and self-acceptance (Nisbet et al., 2010). The connection sub-dimension of environmental identity appears strongly related with experiencing perceptions of wellness through one's emotional and cognitive bond with nature,

exemplified through recreating in nature and through positive experiences in or with natural environments (Mayer & Frantz, 2004; Nisbet et al., 2009, 2010).

Korpela et al. (2009) found that perceptions of well-being are strongly related to place preferences in nature such as urban woodlands, parks, and waterside environments; people perceive natural places as being more emotionally restorative than other areas. In a recent study Korpela et al. (2010) noted that restorative experiences in favorite places were more likely to occur in natural settings than when favorite places consisted of settings in urban environments. Such findings suggest that natural places are more restorative than non-natural or urban places.

Having a favorite place in nature might also impact one's tendency to spend time near or with that place for recreation. For example, the majority of favorite places reported by Korpela and Ylén (2007) were found to include natural settings (i.e., nearby parks, woods, and seashores). Participants in their study also reported using these places in nature as ways to cope with various health complaints (i.e., headaches, chest pains, or dizziness). The authors concluded that having a favorite place in nature might provoke one to spend more time in nature, which may promote wellness through exposure and perceived connection to place.

Protection. Protection is having knowledge about and incorporating elements of nature into one's lifestyle that can be of benefit to one's survival. Components of protection include the following:

1. incorporating elements of nature into one's lifestyle that can be of benefit to one's survival, and

2. taking precautions that would promote one's survival when in the presence of or near species or natural elements that can bring harm to the individual.

Kahn (1997) believed that human preferences and aversions toward different animals and aspects of nature have aided in humanity's survival. Across studies, research has demonstrated that humans prefer settings that include spatial openness, scattered trees and a disbursement of grass-like ground cover as opposed to dense forests, the built environment, or deserts (Balling & Falk, 1982; R. Kaplan & Kaplan, 1989). Although limited research has been conducted, eating organic foods has also been shown to promote perceived wellness, suggesting that the consumption of "natural" foods improves perceived aspects of wellness (K. W. Brown & Kasser, 2005). It has also widely known that humans possess a strong affiliation with non-human animals (i.e., domesticated pets and non-domesticated vertebrates). Fossil evidence shows that humans have had connections with animals as far back as 500,000 years (O'Haire, 2010), which suggests that animals have aided in human survival through different capacities (e.g., sustenance, companionship, and alerting humans to predators). In the present, nearly 63% of families in the United States own domesticated pets (American Pet Products Manufacturers Association, 2008) and the presence of zoos in nearly every major city suggests that humans have a strong fascination and fondness of animals (E. O. Wilson, 1993). Thus, one's connection with nature may serve as a protective mechanism by which humans incorporate aspects of nature that lead to optimal living throughout the lifespan.

Ulrich (1993) contested the notion that there is an inherent basis for phobias of natural organisms; Having a certain level of fear of specific organisms might help the human avoid animals and plants that bring harm to the individual. Classical conditioning experiments have shown that fearful or phobic reactions are often acquired and resistant to extinction for living organisms such as snakes or spiders but not for more dangerous stimuli, such as a weapon (Öhman, 1986; Öhman & Soares, 1994). Several twin studies have provided further evidence that some fears to animals possess a familial or genetic origin (Fyer et al., 1990; Kendler et al., 1992, 2001). Such findings provide evidence that there may be a genetic link between fear response and other life-threatening organisms, thus promoting survival and optimal living.

Preservation. Preservation is taking action related to an environmental cause (e.g., recycling). Kasser (2009) suggested that taking care of nature is associated with a psychological sense of safety or security, feelings of competence, relatedness with other humans, and autonomy. He believed that partaking in ecologically sustainable behaviors could promote the satisfaction of these aspects of wellness. In fact, researchers have successfully linked ecological behaviors (i.e., giving environmentally friendly gifts, turning off the lights, recycling, and reusing various goods) with reductions in stress, increased happiness in adolescents, higher life satisfaction, and positive affect (K. W. Brown & Kasser, 2005, Study 1; K. W. Brown & Kasser 2005, Study 2). Mayer and Frantz (2004) found that an “environmentalist” identity was connected with a measure of well-being. Jacob et al. (2009) found relationships between ecologically sustainable behavior, and subjective wellbeing, suggesting that ecologically sustainable behaviors

contribute to subjective well-being. Thus, taking action in regard to a nature-related cause serves to promote some aspects of wellness.

Environmental identity has been a widely studied construct, especially in regard to the facilitation of environmentally sustainable behaviors and activism (Kempton & Holland, 2003). Reese and Myers (2012) suggested that environmental identity is the inclusion of nature into one's perceived sense of self. A review of the literature has pointed toward specific components of self-concept including connection, protection, and preservation. While such constructs have been associated with one's functional, emotional, cognitive, and experiential relationship with nature, EcoWellness was also described as the ability to transcend one's self to connect with one's spiritual beliefs and others when in the presence of nature.

Transcendence. Transcendence is the ability to connect with entities outside the self when accessing nature and expanding awareness about one's role or sense of purpose relative to the human and non-human community (Reese & Myers, 2012). Reese and Myers grounded this aspect of EcoWellness in transpersonal psychology (Maslow, 1971) and Adler's conception of social interest (Adler, 1954). They proposed that these theories and the multidisciplinary research point to two aspects of transcendence in the context of EcoWellness: community connectedness and spirituality.

***Spirituality*.** Spirituality is considered as having two distinct components when in the presence of nature. Spirituality is

1. a perceived connection with one's conception of a higher power or life-guiding beliefs when in the presence of nature;

2. the ability to find inner peace when exposed to nature; and
3. having a sense of seclusion and being away from one's typical environment.

Nature has been found to promote feelings of connectedness with others, prompt experiences of awe, enhance one's connection with a higher power, increase one's awareness of self and surroundings, and promote positive feelings (Fox, 1997; Sweatman & Heintzman, 2004). Ellard et al. (2009) found that vacationers in nature experienced a closeness to and appreciation for God, a sensation of peace and calm, and appreciation for nature. Daniel (2007) found that nature experiences lead to a greater awareness of God, nature, and self. The enhancement of one's feelings might be explained through having a sense of being away while in nature.

Experiencing a sense of being away has also been found to contribute to a sense of cognitive restoration. For example, children diagnosed with ADHD who had access to green play settings outside of their typical environments experienced decreased symptoms of ADHD relative to children who primarily played in built outdoor and indoor settings (Faber Taylor & Kuo, 2011). Children diagnosed with ADHD have also been found to perform better on mental tasks after walking in a park, suggesting a restoration in focus and concentration (Faber Taylor & Kuo, 2009). Thus, having access to nature outside of one's typical environment can replenish cognitive resources.

Unruh and Hutchinson (2011) found that places such as gardens are viewed by their attendees as spiritual places and the act of gardening was viewed as a spiritual journey. The researchers concluded that leisurely pursuits such as gardening could have dramatic impacts on spiritual coping or the ability to feel at peace with one's perceived

challenges. Thus, nature appears to have several impacts on spirituality, including the feeling of being away from one's typical environment, influencing people to feel closer to their conception of a higher power, beliefs, and a greater ability to feel at peace.

***Community connectedness*.** Community connectedness is "the propensity for individuals to consider the needs of other living things as much as one's own needs when exposed to natural environments" (Reese & Myers, 2012, p. 403). This aspect of transcendence includes the following components:

1. a greater sense of interconnectedness with the human and non-human community through contact with nature, and
2. compassionate and generous acts toward others when exposed to nature.

Empirical support for the sub-dimension community connectedness is found in research including communities and nature (i.e., community gardening).

Okvat and Zautra (2011) reviewed the multidisciplinary literature that related human wellness and nature. They referenced several studies indicating nature plays a pivotal role in providing a sense of oneness. For example, nature has been found to increase social contact with neighbors (Sullivan et al., 2004), create better and more intimate relationships between neighbors (Kuo et al., 1998), decrease feelings of isolation (Milligan et al., 2004; Wakefield et al., 2007), and influence people to be more caring (Weinstein et al., 2009). Furthermore, community gardens promote social health and community cohesion (Wakefield et al., 2007). Community garden participants have been found to describe community gardens as facilitating acts such as increased sharing of foods, culture, ideas for gardening, and recipes, and increasing perceptions of connection

with the community. Community gardens contribute to feelings of community, foster positive social interactions, and facilitate the process of sharing among community members (Wakefield et al., 2007).

Contact with nature also influences persons to act with increased kindness towards others. For example, Milligan et al. (2004) found that the garden plots of individuals who were either sick or away from home were well taken care of by the persons of neighboring plots. Weinstein et al. (2009) found that people highly immersed in natural settings self-reported higher intrinsic value aspirations, focused on relationship and community wellness, and generous decisions, resulting in positive consequences for others. Such findings provide further evidence that immersion in nature impacts values associated with relationship and community wellness. Thus, both community connectedness and spiritualty in nature contribute to one's sense of transcendence, helping the individual to feel connected and part of the broader human and non-human community.

Summary. EcoWellness (Reese & Myers, 2012) was proposed in the professional counseling literature as a way to study and integrate nature into counseling assessment, practice, and research. It was developed through a review of the interdisciplinary literature and three dimensions emerged: access, environmental identity, and transcendence. Reese and Myers tentatively defined the dimensions but did not include a thorough delineation of nature theory and research in further defining and supporting the constructs. An exhaustive review of the literature has prompted the expansion of EcoWellness, which will further aid researchers and practitioners in exploring nature

concepts in professional counseling. Reese and Myers suggested that the development of valid and reliable EcoWellness instrumentation might initiate this process. Several nature assessments have already been explored in the context of nature theory. However, a brief overview of valid and reliable instrumentation specific to the proposed dimensions of EcoWellness underscores the need for a new assessment.

Assessment in EcoWellness

Numerous instruments have been developed to assess human-nature connections. Currently, a valid and reliable instrument of EcoWellness integrating the constructs proposed dimensions do not exist. However, several instruments have been developed to explore certain aspects of the EcoWellness construct.

Access. An under abundance of assessments have been developed to assess an individual's access to nature. In fact, to date, only one scale has been developed with the purpose of assessing one's physical access to nature. The Nature Contact Questionnaire (NCQ; Largo-Wight et al., 2011b) was developed to survey the frequency with which workers spend time outside on breaks, whether participants had live plants in their offices, and whether workers have a view of nature through a window, among other aspects of contact with nature. The questionnaire includes 16-items utilizing a numbered checklist (i.e., 0 to 5 or more or N/A) to measure exposure to nature. Participants are asked to list the frequency of nature exposure (e.g., "How many times did you eat lunch outside" and "how many plants do you have in your workspace") as well as percentage of exposure (e.g., "what percentage of the time did you have sunlight lighting your space"). Participants are instructed to answer the questionnaire based on their nature exposure in

the previous week. Largo-Wight et al. (2011b) utilized a sample of 503 office workers at a university in the southeast United States in testing the validity and the reliability of the instrument. The internal consistency of the instrument was .64 and the test-retest reliability (after two weeks) was .85 ($p < .01$). Construct validity was tested using the Kaiser-Meyer-Olkin test, which was calculated to be .68, indicating satisfactory sampling adequacy. The study authors identified three factors through a principal components analysis: Outdoor Nature Contact (e.g., outdoor work breaks), Indoor Nature Contact (e.g., live plants or flowers), and Indirect Nature Contact (e.g., nature photography and sculptures). The three factors combined to account for 68.8% of the variance in nature exposure within the model.

Thus far, research utilizing the NCQ has been minimal. In one study, which was reported previously, Largo-Wight et al. (2011a) utilized the NCQ in assessing the perceived stress, stress-related behaviors, and stress related health outcomes of workers ($N = 503$) at a southeastern university. They utilized the NCQ to assess nature contact at work and used additional scales that assessed perceived stress, stress related behaviors, and health outcomes. Researchers found negative associations between contact with nature and stress and negative associations between contact with nature and health complaints. The authors concluded that the more nature people could experience throughout the workday, the greater the health outcomes and lower the stress. Although the NCQ appears to be helpful in measuring one's access to nature, the structure of the measure appears to be unreliable (possessing a low internal consistency) and is limited to assessing only one context (i.e., work) in which people access nature.

Environmental identity. Several measures of environmental identity have already been reported (Mayer & Frantz, 2004; Nisbet et al., 2009), both of which were described within the context of nature theories. Nisbet et al. (2009) recently developed the nature relatedness construct as a way to evaluate a person's connection with nature. The development of the instrument was discussed within the context of biophilia, although the measure does not assess the underlying theoretical features of biophilia. The original 30-item NR was developed and tested with 831 undergraduate psychology students in Canada. The scale is answered on a five-point Likert scale, one indicating strongly disagree and five indicating strongly agree. Factor analysis suggested that NR measured the affective, cognitive, and experiential components of one's connection with nature (Nisbet et al., 2009). The affective factor consisted of how a person's thoughts and emotions are affected by his or her connection to nature; the cognitive factor included cognitive awareness of how one impacts nature with his or her actions; the experiential factor included the extent to which one actively seeks out nature as a place to be in. The three factors accounted for a combined 34% of the variance. The NR displayed moderate effect sizes with environmental behaviors, had moderate internal consistency, and possessed moderate to high test-retest reliability. In addition, the NR demonstrated high discriminant validity when predicting self-reported environmental behaviors. Thus, the NR does appear to measure three components of nature relatedness, though more research is needed to further test the construct of nature relatedness (Nisbet et al., 2010).

The Connectedness to Nature (CNS) scale, which was developed by Mayer and Frantz (2004), was described within the context of ecopsychology. The purpose of the

nature connectedness construct is to help researchers study the experiential, emotional connection one has with nature. The CNS is a 14-item Likert-style questionnaire that explores the extent to which one feels emotionally connected to nature (Mayer & Frantz, 2004). The instrument was administered to nearly 550 participants (both college and non-college participants) in five different studies to determine validity and reliability (Mayer & Frantz, 2004). Across studies the CNS demonstrated high test-retest reliability and high discriminant validity. Participants scoring high on other measures of human-nature connectedness as well as the CNS reported increased environmental involvement and participation in environmental agencies. In addition, the affective factor of the CNS accounted for nearly 38% of the variance in total scores. CNS has also been associated with higher pro-environmental characteristics (Mayer & Frantz, 2004). Both the NR and CNS have helped researchers explore links between feeling a closeness with nature and environmental activism and actions. However, these constructs and their associated scales were not intended to assess environmental identity as conceptualized within EcoWellness, which limits their utility in the construct's assessment.

Transcendence. To date, no assessment for the transcendence dimension of EcoWellness has been developed. However, several instruments have been established to assess for sense of community (McMillan & Chavis, 1986) and spirituality (Howden, 1992). Neither of these assessments have been discussed thus far as they have not been used in the development and testing of nature theory.

Community connectedness. McMillan and Chavis (1986) conceptualized sense of community as feeling like one belongs and matters to others and the group as a whole,

and believing that one's needs will be met through the group. The authors also proposed four dimensions of sense of community. Membership is a feeling of belongingness or personal relatedness. Influence is the perception that one matters to other people within the community and making a difference. Reinforcement of needs is fulfilling ones needs through resources offered by the community. Shared emotional connection is the commitment to and belief that members of the community share and will continue to share a history, common places, and time together. Sense of community was first operationalized using the Sense of Community Index (SCI). However, the reliability of the four subscales was inconsistent and typically low. The SCI was also answered using true-false responses, which limited the variability of the instrument (Chavis et al., 2008). Chavis et al. (2008) developed a 24-item Sense of Community Index version 2 (SCI-2), which is answered on a Likert-type scale. The SCI-2 was normed on a sample of 1,800 people. The internal consistency is high (Cronbach's alpha = .94) and the subscales include reliable coefficient alphas, which range between .79 and .86. As hypothesized, the subscales include Reinforcement of Needs, Membership, Influence, and Shared Emotional Connection. The conceptualization of sense of community, although interesting and prominent in the health education field, does not incorporate nature into its conceptualization.

Spirituality. Howden (1992) conceptualized spirituality as the integration of one's unifying interconnectedness, purpose and meaning in life, innerness and inner resources, and transcendence. The definition includes the following four characteristics: purpose and meaning in life, innerness or inner resources, unifying interconnectedness, and

transcendence. Purpose and meaning in life is the active search for events or relationships that provide one with self-worth and hope; innerness is striving for wholeness and a sense of empowerment while innerness is feeling strength, peace, and calmness during times of uncertainty; interconnectedness is feeling related with others, the experience of feeling connected with all of life, and experiencing oneness with the universe; transcendence is having the ability to move one's self beyond typical human experience and the capacity for achieving wellness.

Howden developed the Spirituality Assessment Scale (SAS; Howden, 1992) to operationalize his conception of spirituality. The instrument includes 28 items and includes a 6-point Likert-response format ranging from Strongly Disagree to Strongly Agree. The researcher sums the responses to the 28 items to score the instrument. Subscale scores are calculated by summing the responses to subscale items. The instrument has been found to have high internal consistency (Cronbach's Alpha = .92; Howden, 1992). The four subscales also demonstrated moderate internal constancy which are as follows: Purpose and Meaning in Life, .92, Innerness or Inner Resources, 0.79, Unifying Interconnectedness, .80, Transcendence, .71. The SAS definition and instrument have several overlapping features with spirituality within EcoWellness. However, similar to the sense of community construct, the SAS lacks incorporation of nature within its conceptualization.

Summary. Several assessments have been developed to explore constructs related to the underlying dimensions of EcoWellness. Access to nature has been operationalized in the form of a questionnaire that assesses how much nature one experiences at work

(Largo-Wight et al., 2011b). In addition, several assessments of environmental identity have been developed (Mayer & Frantz, 2004; Nisbet et al., 2009). Finally, measures including aspects of transcendence have been developed, including a measure of spirituality (Howden, 1992) and a measure of sense of community (Chavis et al., 2008). Despite the usefulness of these related constructs, such measures were not designed to operationalize EcoWellness. And although some aspects of EcoWellness (i.e., spirituality and environmental identity) share similar conceptualizations with other identical terms, they have been defined in nature-specific ways within the context of EcoWellness. Therefore, to date, a reliable and valid assessment of EcoWellness does not exist. The development of an EcoWellness measure that integrates the construct's three proposed dimensions might aid in the scientific study of and integration of nature into professional counseling.

Chapter Summary

This chapter began with the explication of a variety of definitions of nature and related concepts (Beringer, 2004; Cookson, 2011; Kahn, 2011; Louv, 2012; Maller et al., 2006; Thoreau, 1906), followed by the description of nature theories (R. Kaplan & Kaplan, 1989; Ramkissoon et al., 2012; Roszak, 1992; Ulrich, 1983; E. O. Wilson, 1984) and their associated research (Balling & Falk, 1982; K. W. Brown & Kasser, 2005; Faber Taylor & Kuo, 2011; Korpela & Ylén, 2007; Ulrich et al., 1991). With such diverse definitions, nature has proven to be challenging to conceptualize throughout different theories, studies, and therapeutic applications. Despite such challenges, researchers in disciplines other than professional counseling have managed to identify many positive

associations between nature and aspects of human holistic wellness (Brymer et al., 2010; Guite et al., 2006; Kuo, 2010; Weinstein et al., 2009). For example, exposure to nature has been shown to assist individuals in reducing symptoms of stress, alleviating symptoms of mood disorders, decreasing recovery time from surgeries, and restoring focus and concentration (Hartig et al., 1991; R. Kaplan & Kaplan, 1989; Taylor et al., 2001; N. M. Wilson et al., 2008; Ulrich, 1984).

Although there exists an extensive range of research evidence, the inclusion of nature in interdisciplinary wellness models remains implicit rather than explicitly defined or emphasized. The IS-Wel (Myers & Sweeney, 2005a) is a well-researched and evidence-based wellness model in counseling intended to promote optimal living across the lifespan with clients. Like other wellness models, nature is not operationalized in the IS-Wel. However, EcoWellness was proposed in the context of the IS-Wel to begin exploration of the wellness effects of nature in counseling (Reese & Myers, 2012). The explicit inclusion of nature in wellness models may further assist counselors in articulating *how* change in holistic wellness occurs through the integration of nature into counseling.

Reese and Myers (2012) proposed that people experience holistic wellness resulting from a perceived connection with nature through accessing nature, possessing a strong environmental identity, and being able to transcend one's self when in the presence of nature. Based on further review of the theoretical and empirical literature, the dimensions of EcoWellness have been more fully defined and integrated. A thorough review of the multidisciplinary literature here (Alvarsson et al., 2010; K. W. Brown &

Kasser, 2005; Conrad & Adams, 2012; Jacob et al., 2009; Kahn et al., 2008; Korpela et al., 2010; Wells & Lekies, 2006) has provided an added layer of depth to EcoWellness and its proposed dimensions.

Although researchers have operationalized a variety of closely related constructs in the form of assessments (Chavis et al., 2008; Howden, 1992; Largo-Wight et al., 2011b; Nisbet et al., 2009) none have been uniquely created to assess EcoWellness. According to Reese and Myers (2012), the next phase in the scholarly inquiry of EcoWellness is to develop a reliable and valid measure operationalizing the tenets of the construct. However, to date, a valid and reliable assessment of EcoWellness has not been constructed. The creation of such an instrument might assist practitioners and researchers more effectively integrate nature into counseling assessment, practice, and research.

CHAPTER III

METHODOLOGY

A review of the literature indicated that a broad variety of nature theories and research supports the assertion that nature impacts aspects of holistic wellness. It also revealed that the multidisciplinary wellness models have overlooked the impacts of nature on human holistic wellness. EcoWellness was developed in the counseling literature (Reese & Myers, 2012) to begin exploring the role of nature in wellness counseling. However, the proposed theory and underlying constructs of EcoWellness awaits measurement and evaluation. The aim of this study was to develop and test the reliability and validity of an instrument that operationalized the EcoWellness (EW) construct. This chapter includes a detailed description of the study's methodology, including research questions and hypotheses, a detailed description of the instrument's development, participants, procedure, instrumentation, and data analyses.

Research Questions & Hypotheses

This study was guided by the following overarching question: Is the REI, including its subscales (e.g., Access, Environmental Identity, and Transcendence), valid and reliable? This larger guiding question was broken down into seven research questions, which can also be found along with their associated variables and analyses in Table 1.

Table 1

Research Questions, Variables, and Data Analysis

Research Question	Hypothesis	Variables	Analysis
RQ 1: Does the REI possess construct validity?	*Hypothesis 1*: An EW model with three second-order (Access, Environmental Identity, and Transcendence) and corresponding first-order factors (see variables) will exhibit adequate model fit.	All items in each proposed dimension: 1. Access (sensory access and physical access) 2. Environmental identity (connection, protection, preservation) 3. Transcendence (spirituality and community connectedness)	CFA followed by EFA (if necessary) (LISREL, SAS, and SPSS) Chi-Square Difference Test (CSDT) Asymptotic standard errors (ASE) or Bootstrapped standard errors (BSE) (if necessary)
RQ 2: Does a general EW factor exist that describes the associations among the lower order factors?	*Hypothesis 2:* A general third-order factor (EW) will exhibit adequate model fit that is not appreciably worse fit than a second-order factor model.	REI REI subscales	CFA/EFA CSDT ASE or BSE (if necessary)
RQ 3: Does the REI scale and its subscales possess high internal consistency reliability?	*Hypothesis 3*: The REI and its subscales will possess high reliability, as evidenced by an obtained Cronbach's alpha of at least .80 on each of the REI's empirically determined scale and subscales.	REI REI subscales	Cronbach's Alpha (SPSS)

Table 1 (cont.)

Research Question	Hypothesis	Variables	Analysis
RQ 4: Do the subscales of the REI display distinct traits?	*Hypothesis 4:* As a way to demonstrate discriminant validity, the subscales of the REI will have disattenuated correlations with one another at or below .85.	REI subscales	Disattenuated correlations
RQ 5: Does the REI and its subscales account for a significant proportion of variance in overall wellness?	*Hypothesis 5:* As a way to demonstrate convergent validity, a significant proportion of variance in overall wellness (operationalized as the overall score on the Five-Factor Wellness Inventory) will be accounted for by REI and its subscales.	REI REI subscales Overall Wellness	Multiple Regression (SPSS)
RQ 6: Is the REI susceptible to socially desirable responding?	*Hypothesis 6:* REI and REI subscale scores will not be correlated with a measure of socially desirable responding.	REI REI subscales Social Desirability (operationalized as the M-C 1(10); Strahan & Gerbasi, 1972)	Pearson Product Moment Correlations

Table 1 (cont.)

Research Question	Hypothesis	Variables	Analysis
RQ 7: Will demographic factors account for a significant proportion of variance in EcoWellness and its subscales?	*Hypothesis 7*: Since this question is exploratory in nature, no explicit hypothesis is indicated. Comparisons will be made when sample size allows.	REI 3 second-order scales Gender Race/Ethnicity Sexual Orientation Marital Status Highest education level Status as student Geographic Location Employment Status Current EW Importance of EW Avg. time in nature	4 separate multiple regressions including REI and 3 second-order scales (SPSS) w/ Bonferonni correction—(i.e., related tests change alpha by dividing number of tests run. ($p < (.05/4)$)

Research Question 1: Does the REI possess construct validity?

Hypothesis 1: An EcoWellness model with three second-order (Access, Environmental Identity, and Transcendence) and corresponding first-order factors (see variables in Table 1) will exhibit adequate model fit.

Research Question 2: Does a general EcoWellness factor exist that describes the associations among the lower order factors?

Hypothesis 2: A general third-order factor (EcoWellness) will exhibit adequate model fit that is not appreciably worse fit than a second-order factor model.

Research Question 3: Do the REI scale and its subscales possess high internal consistency reliability?

Hypothesis 3: The REI and its subscales will possess high reliability, as evidenced by an obtained Cronbach's alpha of at least .80 on each of the REI's empirically determined scale and subscales.

Research Question 4: Do the subscales of the REI display distinct traits?

Hypothesis 4: As a way to demonstrate discriminant validity, the subscales of the REI will have disattenuated correlations with one another at or below .850.

Research Question 5: Do the REI and its subscales account for a significant proportion of variance in overall wellness?

Hypothesis 5: As a way to demonstrate convergent validity, a significant proportion of variance in overall wellness (operationalized as the overall score on the Five-Factor Wellness Inventory) will be accounted for by the REI and its subscales.

Research Question 6: Is the REI susceptible to socially desirable responding?

Hypothesis 6: REI and REI subscale scores will not be correlated with a measure of socially desirable responding.

Furthermore, as this is a new area of scientific inquiry, an additional non-directional exploratory research question is included.

Research Question 7: Will demographic factors account for a significant proportion of variance in REI and its subscales?

Hypothesis 7: Because this question is exploratory in nature, no explicit hypothesis is indicated. Comparisons will be made when sample size allows.

REI Instrument Development

The REI scale development process has integrated the work of several scholars (Crocker & Algina, 1986; Dawis, 1987; DeVellis, 2003). For the purposes of this study, recommendations for scale development have been broken down into six steps. The steps include the following: determining the instrument's use, determining the scale definitions, determining the scale proportions, constructing and evaluating the items, piloting the items and revising, and field testing for validity and reliability, analyzing, and adjusting the items for further testing. To provide clarity into the procedures of instrument development, each step is delineated.

Step 1: Clarifying the Instrument's Purpose

The purpose of developing an EW measure is to help researchers and counseling practitioners determine the extent to which people may benefit from nature when integrating it into counseling. More specifically, the purpose of the REI includes the following:

1. To screen potential clients for the appropriateness of outdoor or nature-based interventions (e.g., wilderness therapy interventions)
2. To assess the wellness benefits related to an individual's perceived connection with nature,
3. To identify areas of strength in relation to EcoWellness that counselors may use to enhance the effectiveness of other counseling interventions and
4. To identify which areas of one's connection with nature that the individual can strengthen with a helping professional to promote optimal living.

Identifying the extent to which an individual perceives wellness benefits from connecting with nature might help clients more effectively experience nature across the lifespan.

Step 2: Determining Scale Definitions

Reese and Myers (2012) conceptualized an EW definition and additionally posited several dimensions of the construct, which included access, environmental identity, and transcendence. They suggested that transcendence also included aspects of spirituality and community connectedness. A review of the literature in Chapter II indicated the need for access and environmental identity to be broken down as well. Access includes the sub-dimensions of physical access and sensory access. Environmental identity includes the sub-dimensions of connection, protection, and preservation. Definitions for each proposed dimension and sub-dimension were presented in Chapter I and grounded in the literature in Chapter II. A construct outline (see Appendix A) was created following the delineation of the definitions.

The REI conceptual outline was created by breaking down the proposed construct definitions into individual item definitions. Following development of the construct outline, the researcher sent it to seven scholars with expertise in scale development, content expertise (i.e., nature and wellness), and nature based field experience. The scholars were asked to respond to a number of different questions (see Appendix B) that instructed reviewers to describe which construct definitions were unidimensional, what definitions might be confusing or redundant, whether any definitions might be missing given the breadth of the EW construct, and what questions or comments the reviewers were left pondering after reviewing the construct definitions. Five out of the seven

reviewers provided feedback. After receiving feedback, the researcher and a helping professional with experience in outdoor activities studied the reviewer comments and critiques. The reviewers did not identify missing construct definitions; however, they did provide critical feedback in regard to several aspects of the definitions. Themes emerged from the reviewer feedback and some construct definitions were changed while others remained the same. The themes included the following:

1. Redundancy within several of the construct definitions (e.g., “a sense of social reciprocity with others” and “compassionate and generous acts and attitudes towards others when exposed to nature” were viewed as being the same experiences by several of the reviewers).
2. Some construct definitions were described as being multidimensional and reviewers recommended splitting such definitions apart (e.g., one rater observed that “the indoors and outdoors are two different concepts”)
3. The need for further elaboration or elimination of several words or phrases in the construct definitions (e.g., “tasting, or “viewing” nature; “positive; “strong”).
4. Confusion in regard to the phrase “on a regular basis,” which was used in the physical access construct definition.
5. Concerns about certain definitions being listed under specific overarching constructs (e.g., one reviewer thought that one construct definition listed under physical access, “The perception of tranquility, safety, or security, when

accessing nature," was inappropriate and did not fit within the conceptualization of physical access).

The researcher chose to leave some construct definitions the same, even when critiqued, when he believed that certain concepts were core to the EW construct. Other definitions were either deleted or modified in response to reviewer feedback. After the construct definitions were modified, the researcher once again reviewed the proposed scale definitions and literature and made further modifications to the construct definitions (see Appendix C). After this review, an initial pool of items for the REI was developed (see Appendix D).

Step 3: Determining Scale and Scale Proportions

Prior to item development, the next stage was to determine the scale format to be used. In considering the scale format, the primary interest of the researcher was to be able to locate individuals across a continuum of EW; thus, a subject-centered format was utilized (e.g., Likert format). In using a Likert (1932) format, declarative statements are written as clearly positive or clearly negative and the respondent can identify a point on a continuum that fits with their gut-level reaction to the test item (Crocker & Algina, 1986). A four-point Likert-type scale was decided upon for the REI (i.e., strongly disagree, disagree, agree, strongly agree). The researcher was initially going to utilize a six-point Likert scale to increase variability (Dawis, 1987), but the ScanTron bubble sheets used for item responses only include a maximum number of five item responses. An even number of response options was chosen to increase variability in responses. Such a

decision also forces respondents to choose one direction or the other with items and takes away the option of a neutral response.

Crocker and Algina (1986) emphasized that the proportion of items created should encompass the various aspects of the construct. The relative importance of the various components of the construct as perceived by the researcher should dictate how many items cover any particular aspect, as opposed to developing equal numbers of items for each characteristic of the construct. More research is needed to determine which components of EW are more or less prominent. Thus, the proportion of items under any construct definition was developed to capture the breadth of each component within the definition. No predetermined proportion of items for any scale definition or proposed dimension of EW were developed prior to item development. Rather, items were written to span the breadth of each construct definition.

Step 4: Item Construction and Evaluation

The next step in developing the REI included the initial construction of items. The researcher and a helping professional (i.e., a physician's assistant) with experience in outdoor activities sat down and wrote items intended to cover the breadth and depth of the EcoWellness construct definitions. They closely followed the item writing guidelines, as described by Crocker and Algina (1986). Examples of the guidelines for item development included writing in present tense language, avoiding double negatives, keeping statement lengths shorter than 20 words, and avoiding indefinite qualifiers (e.g., rarely; Crocker & Algina, 1986). The construct outline was used to guide item writing, and items were initially nested underneath the construct outline. Multiple items were

written for each definition until the researcher and the helping professional believed that the depth and scope for each was attained. Following item development, items were assigned unique identifiers (e.g., A_{PAi01}) that would assist later in the modification or deletion of items. The initial item pool included 148 items (see Appendix D).

Following the development of the initial pool of items, the researcher placed them into a table nested under their associated construct definitions. In addition, directions for the completion of the items were created. The directions and items were sent to the same reviewers (plus one additional reviewer) who were previously invited to provide feedback on the initial item definitions (N = 8). The additional reviewer was asked to provide feedback because she did not possess expertise in the content areas of wellness and nature or in instrument development. This reviewer was added to ensure that items were not overcomplicated and written in ways understandable to respondents lacking content expertise (Sheatsley, 1983). Raters were provided with a rater review form (Crocker & Algina, 1986), which asked them to comment on a number of different issues related to REI directions, purpose, and the items.

The reviewer form was split into two sections. In the first section reviewers were asked to comment on the directions and purpose of the REI instrument using open-ended questions (e.g., “Is the purpose of the assessment clear? As a research participant, would you understand why you are taking the assessment?”). The second section included item ratings and open-ended feedback in regard to the items. Specifically, items were nested underneath their specific construct definitions and reviewers were asked to rate each item

based on whether the item fit within the item definition. They were asked to rate each item on a scale of one to seven, with one indicating “not at all in agreement” and seven indicating “totally in agreement.” Reviewers were also asked to provide qualitative comments, such as wording concerns, questions they had in regard to the item, editorial feedback about the items, and other suggestions. An example of the reviewer form is located in Appendix E. The goal of the expert review was to discard problem items and only maintain items that best fit the description of the construct definitions.

Five of eight reviewers provided feedback on the evaluation forms sent to them. It was originally intended to keep items where the reviewers rated them as all sixes or sevens. However, only two reviewers out of the five consistently utilized the scale provided. Items where raters rated them as having low agreement (Rated a “1” or “2”) with the construct definition were deleted. Since only a few reviewers used the rating scale, reviewer comments were scrutinized in making decisions about items.

Reviewers commented on a number of issues related to the REI directions and items. Several reviewers suggested that the researcher make the term “nature” clearer in the directions by adding examples. Reviewers were also generally concerned with the example item (e.g., “I like to be in nature”) provided in the REI directions and how it was endorsed (i.e., a line was put through “B”). Several reviewers suggested that the researcher shade in a circle to demonstrate how respondents were supposed to use the ScanTron bubble sheet in response to the items. A number of other themes emerged from the reviewer feedback. First, the use of relative language (e.g., “near,” “far,” and “close”) was concerning to several of the reviewers and they recommended that such language be

removed from the assessment. Consequently, items were modified to reduce the use of relative language. Second, some reviewers commented on the relevance of the REI to persons with sensory limitations (i.e., visually and auditory impaired individuals) and encouraged the researcher to decide whether persons with such physical limitations would be excluded from the study. Since the assessment is in the beginning stages of its development, the researcher has decided to hold off addressing this particular concern until more research has been conducted with the instrument. Third, reviewers commented on the use of negatively worded or reverse-coded items, suggesting that they were somewhat confusing. They recommended that if negatively worded items were included, respondents should be prompted about them at the beginning of the survey. The researcher decided to delete or reword negatively worded items into positively worded items to avoid confusion in this regard. Fourth, items in physical access (e.g., "I socialize in nature") associated with interpersonal relationships occurring in nature were found to be confusing and unrelated to the physical access by reviewers. The researcher agreed with the reviewers' critiques and the researcher deleted items in the physical access dimension that mentioned social properties. Fifth, reviewers highlighted the use of double-negatives and subsequently the researcher deleted or reworded items with double-negatives. Sixth, all reviewers shared general concerns about the wording of items. Many items were reworded or dropped from the REI in response to reviewer critiques.

Lastly, one reviewer recommended that the researcher needed to develop an item table that included "Thoughts, Feelings, and Behaviors" so he could create a balance of items covering these aspects. She stated that as the REI stood, the instrument was mostly

about behaviors and often left out thoughts and feelings. The reviewer suggested that creating such a table and subsequently altering items to have a balance between thoughts, feelings, and behaviors was more representative of the EW construct and also would prompt variability in responses to the items. Such a table was developed by the researcher and is included in Appendix F. The reviewer used the table in Appendix F in the integration of all reviewer feedback as it helped in the rewording, adding, and deletion of different items. The table helped the researcher restructure some items in creating more balance between the thoughts, feelings, and behaviors underlying the EW construct. The researcher integrated reviewer feedback based on his judgment on whether making changes would improve the extent to which items represented the EW construct and improve items. If a reviewer reported that a portion of the directions, purpose, or an item needed rewording, for example, they were reworded, removed from the scale, or kept the same. Of the original 148 items, 62 were dropped from the REI, 38 were modified, and 25 items were added, resulting in 111 items that were piloted with a sample of undergraduate students (see Appendix G).

Step 5: Pilot Study and Revision

Following the expert review of the initial pool of items, a pilot study was conducted on the REI. The purpose of the pilot study was fourfold. First, an initial exploration of relationships between the proposed scale and subscales were tested through item-level analysis and item total correlations. This analysis was used to identify items that could be dropped from the instrument in the field study to strengthen the instrument's dimensionality and reduce the length of the instrument. The researcher

hoped to cut the instrument in half following the pilot study to make it a more user-friendly assessment. Second, the internal consistency reliability was calculated for the REI and each of the scales. Third, correlations between sub-scores of each proposed dimension of EW were calculated to determine whether each proposed scale was, in fact, distinct. Finally, a major purpose of the pilot study was to identify any flaws or limitations in the study procedures in preparation for the field study.

Sample. The researcher utilized a convenience sample of students enrolled in 100, 200, and 300-level Public Health courses at the University of North Carolina at Greensboro. A total of 396 students were enrolled in all seven of the courses surveyed. Approximately 67% (N = 264) of the students enrolled in the courses completed the REI. The researcher did not count how many students were present in each classroom when administering the assessment so an accurate response rate could not be calculated. However, it is noteworthy that several instructors of the courses commented on the lack of students in attendance (e.g., as many as 50% of enrolled students did not attend one course during data collection).

Demographic data are reported in Table 2. All participants were at least 18 years of age. Approximately half of the sample (n = 132) reported their age. For persons reporting, ages ranged between 18 and 58 years with the mean age being approximately 23 years (SD = 6.3). The median age was approximately 22 years. It is possible that only half of the sample reported age because they were unsure where to report age on the ScanTron bubble sheet. Approximately 78.2% of the sample reported marital status. Of persons who reported marital status, 11.7% were married/partnered, 85.4% identified

themselves as single, 1.0% identified as separated, and 0.5% reported being divorced. In addition, 77.9% of the participants reported their employment status. Approximately 8.3% were employed full time, 52.9% were employed part time, 1.5 % identified as being retired and not working, 0.50% reported being retired and working part time, and 36.8% reported not working. Nearly 78.2% of participants reported their current status as a student. Of those reporting, 1.5% reported being in high school, 74.8% reported working on an undergraduate degree, 2.4% reported working on a graduate degree, and 0.50% reported not currently being a student. Approximately 80% of the sample reported their highest level of education completed. Eighty percent indicated being a high school graduate, 1.5% reported not having a high school degree, 11.8% reported having a trade, technical, or associates of arts degree, and 6.9% reported having a bachelor's degree. About 3.1% of the sample reported having a master's degree, 1.9% having a specialist degree, and 1.1% reported having an earned doctorate degree.

Furthermore, 78.2% of participants reported biological sex. Approximately 22.9% were male and 77.1% were female. Slightly over three fourths of participants, 76.7% reported sexual orientation. Of these, 1.5% reported being gay, 1.0% identified as lesbian, 2.5% identified as bisexual, 94.5% identified as heterosexual, and 0.5% identified as being queer. Among the 78.2% of sample who responded to the question of whether they were biracial, 11.2% identified as biracial. Students were also asked to report primary cultural background. Just over three fourths of the sample, 76% responded, with 3.5% Native American, 6.5% Asian or Pacific Islander, 38.2% African American, 46.2% Caucasian, and 5.5% Hispanic, Latino, or Latina. Participants represented a racially

diverse sample, although non-representative of the North Carolina population. According to 2011 census data in the state of North Carolina approximately 72.1% of persons are white, 22.0% are black, 1.5% are Native American, 2.3% Asian descent, and 8.6% identify as being Hispanic or Latino in origin (United States Census Bureau, 2012).

Table 2

Pilot Study Participant Demographics

Demographic/Characteristic	*n*	%
Marital Status		
Married/Partnered	24	11.7
Single	175	85.4
Separated	2	1.0
Divorced	1	0.5
Widowed	0	0
Employment Status		
Employed Full Time	17	8.3
Employed Part Time	108	52.9
Retired, not working	3	1.5
Retired, working part time	1	0.5
Not working	75	36.8
Student Status		
Yes, in high school	3	1.5
Yes, working on an undergraduate degree	196	74.8
Yes, working on a graduate degree	5	2.4
Yes, taking a course for fun	0	0.0
No, not currently a student	1	0.5
Highest Education		
Less than high school	3	1.5
High school graduate	163	79.9
Trade/technical school/A.A.	24	11.8
Bachelor’s Degree	14	6.9

Table 2 (cont.)

Demographic/Characteristic	*n*	%
Highest Education (cont.)		
Advanced Degree		
Master's Degree	8	3.1
Specialist Degree	5	1.9
Professional degree (DDS, JD, MD)	0	0
Doctorate degree (Ph.D., Ed.D.)	3	1.1
Biological Sex		
Male	47	22.9
Female	158	77.1
Biracial		
Yes	23	11.2
No	180	88.8
Primary Cultural Background		
Native American	7	3.5
Asian or Pacific Islander	13	6.5
African American	76	38.2
Caucasian	92	46.2
Hispanic/Latino/Latina	11	5.5
Sexual Orientation		
Gay	3	1.5
Lesbian	2	1.0
Bisexual	5	2.5
Heterosexual	190	94.5
Queer	1	0.5

Participants were also presented with a definition of EcoWellness and asked to rate the current level of and importance of EcoWellness in their lives (see Table 3). Participants rated current EcoWellness using a one to ten scale with one indicating, "the

least it could be" and ten representing "the most it could be." Most (88.9%) reported their current level of EcoWellness, which ranged from one to ten with a mean rating of 6.3 (*SD* = 1.8). The median level of EcoWellness was 7.0. Participants also used a one to ten rating scale to report the importance of EcoWellness in their lives with one indicating "not at all important" and ten representing "very important." Most participants (89.3%) rated the importance of EcoWellness in their lives. Responses ranged from one to ten with the mean importance of EcoWellness being 7.0 (*SD* = 2.17). The median level of importance of EcoWellness was 7.5. Finally, most participants (88%) reported how many hours they spend in nature in a typical week. Of those who reported, participants spent anywhere from 0 to 140 hours per week in nature. On average, participants spent 10.1 hours with what they consider nature (*SD* = 14.2). The median number of hours spent with nature each week was 5.00.

Table 3

Measures of Central Tendency and Standard Deviations for Reported EcoWellness and Time Spent with Nature

Demographic	*n*	%	Range	Median	*M*	*SD*
Level of EcoWellness	233	88.9	1-10	7.00	6.3	1.79
Importance of EcoWellness	234	89.3	1-10	7.50	7.0	2.17
Hours spent with nature per week (hours)	231	88.0	0-140	5.00	10.1	14.20

The number of hours reported possessed high kurtosis and skewness. The standard skewness index was 4.7 (*SE* = .16) and the standard kurtosis index was 33.9 (*SE* = .32). Kline (2011) reported that an index of skewness of greater than 3.00 represented problematic skew and a kurtosis index of greater than 10.00 indicated problematic kurtosis. Therefore, the reported number of hours spent in nature represents a non-normal distribution and caution should be taken in the interpretation as the other data in this study are interpreted as being normally distributed. Such indices suggest that a large proportion of respondents reported spending time in nature lower than the mean and that several of the respondents reported extreme amounts of time spent in nature (i.e., 140 hours).

Procedures. Upon approval from the Institutional Review Board (IRB), the researcher visited the aforementioned courses in public health. The same written script was utilized during each classroom recruitment (see Appendix H). After the script was read, the researcher handed a paper-clipped packet to participants that included an informed consent document (Appendix J), a ScanTron bubble sheet, a demographic questionnaire (adapted from the 5F-Wel; Myers & Sweeney, 2005b), the 111-iem REI (see Appendix G), and a supplementary form that invited participants to share their perceived level of EcoWellness, the importance of their level of EcoWellness, the number of hours spent in nature in a typical week, and whether any of the directions or items seemed unclear to them (see Appendix I). The REI and demographic questions were included in a stapled six-page (front and back) document. The demographic questions were located on the sixth page of the document following the REI. The

supplementary form was a two page (front and back) separate sheet of paper included in the packet. The bubble sheet was also a "loose" piece of paper included in the packet. Students had the choice of either completing the instrument or sitting quietly during the duration of the administration of the instrument. Upon completion of the instrument, respondents raised their hand and the researcher picked up the assessment, responses, and pencils. Once all of the data were collected, ScanTron bubble sheets were taken to a scanning center at the University of North Carolina at Greensboro where the data was uploaded into SPSS. Open-ended feedback about participant concerns regarding the REI's directions and items were considered during data analyses.

Data analyses. After the data were received from the testing center, quantitative analyses using SPSS and review of open-ended responses were conducted. In addition, item descriptive statistics were examined for the purposes of looking at trends within item variability as well as flagging potential items for removal. First, the data were scanned for missing data. Participants who admitted to randomly answering items in their written feedback or participants who failed to complete most items were automatically eliminated from all item analyses (n = 2). Participants with few cases of missing datum were removed using listwise deletion in the data analyses.

Once missing data were taken into account, the items for the REI were reverse-coded. Participants had been instructed to rate items using "A" to "D" bubble sheets, which corresponded with numeric ratings "1" to "4." If a participant "strongly agreed" with an item, he or she would answer "A" on the bubble sheet, which corresponded with "1." Thus, the researcher reverse-coded items so that higher scores would indicate higher

EcoWellness and lower scores would indicate lower EcoWellness. Next, internal consistency reliability was calculated for overall EcoWellness, its proposed scales (i.e., access, environmental identity, and transcendence), and their proposed sub-scales (Cronbach's alpha). Third, sum scores were calculated for each of the proposed second-order scales and correlated with one another to determine the extent to which they were related in establishing whether each subscale represented distinct sub-dimensions of EcoWellness (D. T. Campbell & Fiske, 1959). The next step in the analyses included flagging individual items based on item means, standard deviations, skewness and kurtosis, and corrected item total correlations. Several decisions were made in regard to items based on the flagging. Flagged items were considered for keeping without changing the wording, changing the wording of the item and keeping, or dropping the item from the scale.

As mentioned, the flagging of an item included review of corrected item total correlations, item-level means and standard deviations, kurtosis, and skewness. Although Costello and Osborne (2005) suggested that item-total correlations be considered for dropping when below .32, a more stringent criteria (corrected item-total < .40) was adopted for this pilot study since most corrected inter-item correlations were above .32. A more stringent criteria was used to because one of the primary goals of the pilot study was to reduce the number of items on the REI. Next, items with low variability (< .75 standard deviations) were flagged. In addition, indices of skewness and kurtosis of individual items were calculated to identify the distribution of responses to items and help further guide the model under which the CFA is conducted in the field study (i.e.,

weighted least squares or maximum likelihood). It was determined prior to analyses that a maximum likelihood approach to CFA would be utilized when items had low to moderate kurtosis and skewness, indicating a relatively normal distribution of scores across items. However, if many items possessed high kurtosis (as defined by an index of kurtosis greater than 10.00) and/or high skewness (as defined by an index of skewness greater than 3.00; see Kline, 2011), the researcher and his dissertation committee would consider conducting a CFA using a weighted least squares (or categorical) approach. For the purposes of this study, items possessing indices of kurtosis or skewness above a magnitude of 1.0 were flagged for further review since few items possessed skewness of 3.00 and kurtosis of 10.00.

Finally, the redundancy of items was considered in the analyses. In fact, before flagged items were considered for removal, the researcher and a member of his dissertation committee identified items that they deemed redundant. If the researcher and a member of his dissertation committee decided that an item was redundant or identical in concept or language to one or more items, it was decided that the item with the strongest item statistics would be maintained and the item(s) with the poorer statistics be considered for dropping. The researcher and a dissertation committee member made a decision whether to revise, remove, or maintain a flagged or redundant item as written. The researcher then reduced each scale one item at a time. Each time an item was removed, the researcher reran item-level analyses and scale reliability. The goal was to reduce the number of items by nearly half and maintain scale reliabilities of at least .90.

The analyses described and decisions made by the researcher for the inclusion or exclusion of each item and subscales are reported next.

Results. Prior to data analysis, one participant was automatically excluded from all analyses as he or she admitted to "Christmas-treeing" responses to items. One additional participant was excluded from the analyses as he or she failed to answer items past item 60. The exclusion of these two participants left 262 usable cases of data. A total of 21 other participants did not complete one question on the REI. Thus, such cases were removed using listwise deletion during reliability analyses and pairwise deletion during sum score correlational analyses to minimize missing cases in data analyses.

***Reliability*.** The researcher first conducted reliability analyses using a measure of internal consistency (see Table 4). Cronbach's Alpha was calculated for each of the proposed scales and subscales. Cronbach's alphas were as follows for overall EcoWellness and the proposed scales: Overall EcoWellness, .98, Access, .95, Environmental Identity, .94, and Transcendence, .97. It should be noted that a "Warning" message appeared in SPSS when conducting these reliability analyses. The message stated, "The determinant of the covariance matrix is zero or approximately zero. Statistics based on its inverse matrix cannot be computed and they are displayed as system missing values." It is believed that this warning message appeared because several items in the scales are nearly identical, thus indicating that one or more items could be nearly perfectly predicted from others. Thus, these reliability analyses were interpreted with caution. The proposed sub-scales and reliabilities were as follows: Physical Access, .86,

Sensory Access, .93, Connection, .95, Protection, .75, Preservation, .75, Spirituality, .95, and Community Connectedness, .93.

Table 4

Internal Consistency Reliability for Overall EcoWellness and Proposed Scales and Subscales

Scale	Items	Cronbach's Alpha
Overall EcoWellness	**1-111**	**.98**
Access	**1-42**	**.95**
Physical Access	1-15	.86
Sensory Access	16-42	.93
Environmental Identity	**43-83**	**.94**
Connection	43-65	.95
Protection	66-77	.75
Preservation	78-83	.75
Transcendence	**84-111**	**.97**
Spirituality	84-102	.95
Community Connectedness	103-111	.93

***Discriminant validity*.** Next, the sum scores of the three proposed scales of the REI were calculated. Following summation, the scores were correlated using Pearson's *r* correlation statistic and converted to disattenuated correlations ($r_{x'y'}$) to determine the level of overlap in the proposed scales and whether they constitute distinct constructs (see

Table 5). A disattenuated *r* statistic was used because when two scales are correlated, measurement error lowers the correlation coefficient and therefore the "true" relationship between the scales. The disattenuated correlation more closely approximates the true scores of the scales through the combination of the Pearson's correlation and scale reliabilities. When two scales share a disattenuated correlation above a certain magnitude, they are considered to be measuring the same trait (Jöreskog, 1971). A standard disattenuated *r* statistic for determining discriminant validity has not been widely recognized. However, some researchers (Ghanizadeh, Izadpanah, & Abdollahi, 2007) have suggested that a cut-off of .85 be used in determining whether constructs measure the same or distinct constructs. Meaning, a disattenuated correlation above .85 between two scales indicates the same construct is being measured and a disattenuated correlation below .85 indicates separate constructs.

Table 5

Internal Consistency Coefficients, Pearson's *r* Correlations, and Disattenuated Correlations between the Sum Scores of the Proposed Subscales of EcoWellness

Proposed Scale	Access	Environmental Identity	Transcendence
Access	.95	.86	.70
Environmental Identity	.81	.94	.80
Transcendence	.66	.76	.97

Note. Cronbach's alphas appear on the diagonal, disattenuated correlations are listed above the diagonal, and Pearson's *r* correlations appear below the diagonal.

Rather than using the .85 disattenuated *r* statistic as a strict rule in this pilot study, it was used as a guideline. The researcher found that all three of the proposed subscales

were significantly related at an alpha level of less than .05, and one disattenuated correlation was above the cut-off. The highest disattenuated correlation was found between Access and Environmental Identity ($r_{x'y'}$ = .86, p < .05), suggesting that Access and Environmental Identity may assess the same trait. Transcendence was correlated with Access ($r_{x'y'}$ = .70, p < .05) and Environmental Identity ($r_{x'y'}$ = .80, p < .05) to a lesser extent, but Transcendence appears to assess traits distinct from Access and Environmental Identity according to the guideline. Caution should be employed when interpreting these correlations, as no standard disattenuated correlation coefficient for discriminate validity has been established in the literature. More research is needed to determine the distinctiveness between the proposed scales of the REI.

Item-level analyses. The next step in the data analyses included the flagging of items. As previously stated, the flagging of items included several stringent indices, including item variability (i.e., standard deviations), indices of skewness and kurtosis, and corrected item-total correlations. A total of 34 items across scales were flagged for further review. Flagged items that were also deemed redundant were especially scrutinized, but the researcher and dissertation committee member went item by item to determine whether to drop, modify or keep an item as is. A total of 49 items were removed from the REI. The specific items flagged for each proposed scale and the decision based on the flagging is reported. Item-level statistics for each subscale are located in Tables 6-8.

Table 6

Access Scale Item Analysis

Item Code	REI Item No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
A_{PAi01}^{abcd}	1.	Plants and trees can be seen on the same street I live on.	3.76	.555	-2.741	8.700	.265	*
A_{PAi02}	2.	I am attuned to nature wherever I go.	2.98	.732	-.507	.302	.543	*
A_{PAi03}^{b}	3.	Nature surrounds me in my daily life.	3.38	.689	-.808	.040	.508	**.436**
A_{PAi04}^{a}	4.	Animals are present in my day-to-day surroundings.	3.08	.989	-.796	-.464	.359	*
A_{PAi08}	5.	It is important for me to have nature in my daily life.	3.02	.833	-.558	-.236	.678	**.693**
A_{PAi09}	6.	I have hobbies that include nature.	2.87	.958	-.475	-.710	.496	**.496**
A_{PAi13}^{abcd}	7.	Nature is within walking distance from where I live.	3.52	.726	-1.517	1.920	.396	*
A_{PAi17}	8.	The places I go every day are near nature.	3.21	.767	-.634	-.244	.484	*

Table 6 (cont.)

Item Code	REI Item No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
A_{PAi18}	9.	Even when in a car on the freeway, I am aware of the nature around me.	3.24	.764	-.653	-.340	.455	**.419**
A_{PAi19}	10.	My access to nature makes me feel good.	3.27	.766	-.857	.326	.660	**.676**
A_{PAi20}	11.	Accessing nature is essential to me.	2.96	.885	-.428	-.657	.696	**.740**
A_{PAii01}[ab]	12.	I can access nature whenever I choose.	3.34	.675	-.683	.015	.338	*
A_{PAii02}[a]	13.	Getting to nature requires little effort.	3.13	.808	-.775	.254	.199	*
A_{PAii06}[b]	14.	It is easy for me to find nature nearby.	3.40	.686	-.916	.494	.406	*
A_{PAii08}	15.	I feel satisfied with my level of access to nature.	3.15	.763	-.631	.032	.459	*
A_{SAi01}[a]	16.	I enjoy petting domesticated animals.	3.13	.986	-.868	-.360	.366	*
A_{SAi02}	17.	I touch plants.	2.84	.932	-.298	-.850	.573	**.572**
A_{SAi06}	18.	Physical touch with nature is important to me.	2.59	.919	-.004	-.846	.662	**.695**

Table 6 (cont.)

Item Code	REI Item No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
A_{SAii01}	19.	There are smells of nature in and around my home.	3.08	.858	-.676	-.207	.608	**.542**
A_{SAii03}	20.	When I walk outside I can smell the plants and trees.	3.16	.810	-.824	.317	.553	*****
A_{SAii07}	21.	I enjoy the smells of nature.	3.30	.756	-.881	.331	.659	**.683**
A_{SAii08}	22.	I seek opportunities to smell nature.	2.54	.852	.111	-.632	.608	*****
A_{SAii09}	23.	I am happy when I can smell nature.	2.94	.773	-.355	-.308	.613	**.659**
A_{Saii10}	24.	Smells of nature are among life's greatest pleasures.	2.81	.835	-.393	-.319	.575	**.611**
$A_{SAiii01}^{acd}$	25.	I can see nature from my home.	3.40	.761	-1.251	1.241	.389	*****
$A_{SAiii02}$	26.	The place I spend most of my time includes a view to nature.	2.71	.926	-.120	-.892	.573	**.493**
$A_{SAiii07}$	27.	I have photos or artwork of nature within eyesight during the day.	2.41	.965	.159	-.925	.417	**.424**
$A_{SAiii08}$	28.	It is important for me to be able to see nature from my home.	2.89	.944	-.458	-.704	.696	**.721**

Table 6 (cont.)

Item Code	REI Item No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
$A_{SAiii09}$	29.	It is important for me to be able to see nature from my place of work.	2.61	.902	-.086	-.765	.641	*
$A_{SAiii10}$	30.	I need to see nature each day.	2.77	.876	-.088	-.849	.680	**.687**
$A_{SAiii11}$	31.	I have plants in my home.	2.70	1.114	-.246	-1.302	.491	**.504**
$A_{SAiii12}$	32.	I like to have plants inside my home.	2.85	.971	-.356	-.912	.500	*
$A_{SAiii13}$	33.	I feel less stress when I see nature.	3.07	.894	-.686	-.320	.563	**.598**
A_{SAiv01}	34.	I hear nature throughout the day.	2.94	.842	-.466	-.349	.502	*
A_{SAiv02}	35.	When I step outside I hear nature.	3.02	.888	-.691	-.180	.563	**.471**
A_{SAiv03}	36.	I listen to recorded sounds of nature.	1.94	.903	.718	-.264	.286	*
A_{SAiv05}	37.	I can hear nature from inside my home.	2.59	.961	.009	-.973	.474	*
A_{SAiv08}	38.	I like to hear sounds of nature.	3.02	.783	-.572	.079	.699	**.698**
A_{SAiv09}	39.	Listening to the sounds of nature is important to me.	2.57	.889	.071	-.762	.644	**.673**

Table 6 (cont.)

Item Code	REI Item No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
A_{SAiv10}	40.	It calms me to hear sounds of nature.	3.03	.814	-.651	.095	.626	**.616**
A_{SAiv11}	41.	I relax when I hear nature.	3.13	.843	-.675	-.262	.571	*
A_{SAiv12}	42.	I seek experiences where I can hear the sounds of nature.	2.52	.862	.164	-.653	.595	*

Note. Item correlations in table represent corrected item-total correlations. Missing item in the Revised Item Total Correlation column are marked with a * to represent items dropped from scale.
[a] indicates item(s) flagged due to low corrected item total correlation ($r < .32$).
[b] indicates item(s) with low variability ($SD < .50$)
[c] indicates item(s) with high kurtosis (> 1.0).
[d] indicates item(s) with high skewness (> 1.0).

Table 7

Environmental Identity Subscale Item Analysis

Item Code	Item REI No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
EI_{Ci01}[b]	43.	I have good memories of being in nature.	3.20	.738	-.624	.008	.652	*
EI_{Ci02}	44.	Nature brings about pleasant thoughts for me.	3.16	.799	-.698	-.012	.712	**.686**
EI_{Ci03}[bd]	45.	I can recall times I have enjoyed being in nature.	3.39	.706	-1.036	.957	.542	*

Table 7 (cont.)

Item Code	Item REI No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
EI_{Ci04}	46.	The anticipation of being in nature causes me to think good thoughts.	2.86	.835	-.327	-.470	.682	**.663**
EI_{Ci05}	47.	Important life events of mine happened while in nature.	2.74	.925	-.136	-.905	.643	**.625**
EI_{Ci06}[b]	48.	I have had good times in nature.	3.24	.748	-.867	.679	.643	**.614**
EI_{Cii01}	49.	My relationship with nature makes me feel good.	2.98	.754	-.396	-.120	.728	**.712**
EI_{Cii02}[b]	50.	I associate nature with happiness.	3.13	.744	-.446	-.383	.597	*
EI_{Cii03}[b]	51.	My experiences in nature make me happy.	3.18	.743	-.634	.116	.681	*
EI_{Cii04}[b]	52.	I feel like I can be myself in nature.	3.16	.746	-.604	.041	.678	**.639**
EI_{Cii05}[b]	53.	I have positive emotions about nature.	3.29	.679	-.737	.595	.694	*
EI_{Cii06}[b]	54.	I feel good about myself when in nature.	3.09	.742	-.599	.304	.668	*
EI_{Cii07}	55.	I am happiest when in nature.	2.59	.893	.020	-.772	.636	**.600**

Table 7 (cont.)

Item Code	Item REI No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
EI_{Ciii01}	56.	I have one or more favorite places in nature.	3.06	.849	-.639	-.194	.641	**.612**
EI_{Ciii03}	57.	There is a place in nature that brings about feelings of contentment for me.	3.09	.750	-.419	-.336	.670	*
EI_{Ciii04}	58.	I grew up having at least one favorite place in nature.	3.20	.784	-.710	-.054	.593	**.590**
EI_{Ciii05}	59.	I feel good about myself when in certain places in nature.	3.04	.739	-.526	.208	.656	*
EI_{Ciii06}	60.	I have a favorite spot in nature.	2.98	.862	-.405	-.666	.604	**.583**
EI_{Ciii09}	61.	Being anywhere in nature makes me feel good.	2.87	.795	-.218	-.512	.670	*
EI_{Civ01}	62.	Having a hobby in nature contributes to who I am as a person.	2.69	.931	-.026	-.962	.588	*
EI_{Civ04}	63.	I include nature when describing myself to others.	2.29	.893	.340	-.574	.539	**.480**
EI_{Civ05}	64.	My experiences with nature are a big part of who I am.	2.47	.937	.185	-.848	.590	*

Table 7 (cont.)

Item Code	Item REI No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
EI_{Civ06}	65.	Nature is included in my definition of self.	2.25	.883	.427	-.447	.496	*
EI_{Pti01}	66.	I know where the food I eat comes from.	2.77	.923	-.237	-.822	.294	**.181**
EI_{Pti03}	67.	I use renewable energy when I am able.	2.83	.812	-.240	-.482	.412	**.366**
EI_{Pti04}	68.	I know how to grow my own food.	2.56	.948	-.027	-.910	.316	*
EI_{Pti10}	69.	I feel good about my carbon footprint.	2.42	.804	.086	-.446	.420	**.260**
EI_{Pti11}	70.	I am concerned about climate change.	2.87	.874	-.481	-.384	.301	**.349**
EI_{Ptii01}	71.	I avoid getting too close to animals that I know could harm me.	3.25	.899	-1.052	.260	.130	**.459**
EI_{Ptii02}	72.	I know my limits in nature.	3.28	.691	-.782	.744	.223	**.506**
EI_{Ptii03}	73.	I keep a distance from forces in nature that could hurt me.	3.35	.783	-1.199	1.134	.217	*
EI_{Ptii04}	74.	I understand when nature can be dangerous.	3.42	.655	-1.034	1.342	.235	**.520**

Table 7 (cont.)

Item Code	Item REI No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
EI_{Ptii05}	75.	I carry a first aid kit when in nature.	2.06	.912	.592	-.403	.227	*****
EI_{Ptii10}	76.	I avoid getting too close to plants that I know could harm me.	3.31	.787	-1.074	.840	.198	**.510**
EI_{Ptii11}	77.	Some things in nature are beyond my understanding.	3.40	.729	-1.132	1.055	.386	**.317**
EI_{Pv01}	78.	I feel strongly about an environmental cause.	2.86	.821	-.278	-.499	.509	**.519**
EI_{Pv03}	79.	Having a positive impact on the health of the planet is important to me.	3.10	.737	-.507	.005	.528	**.519**
EI_{Pv04}	80.	I do my part in preserving nature.	2.88	.720	-.192	-.252	.571	**.577**
EI_{Pv05}	81.	If I see litter on the ground I pick it up.	2.74	.897	-.244	-.701	.442	**.452**
EI_{Pv06}	82.	I recycle.	3.25	.804	-.925	.387	.352	**.362**

Table 7 (cont.)

Item Code	Item REI No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
EI_{Pv09}	83.	I am satisfied with my efforts to preserve nature.	2.68	.772	-.074	-.397	.365	**.356**

Note. Item correlations in table represent corrected item-total correlations. Missing item in the Revised Item Total Correlation column are marked with a * to represent items dropped from scale.
[a] indicates item(s) flagged due to low corrected item total correlation ($r < .32$).
[b] indicates item(s) with low variability ($SD < .50$)
[c] indicates item(s) with high kurtosis (> 1.0).
[d] indicates item(s) with high skewness (> 1.0).

Table 8

Transcendence Subscale Item Analysis

Item Code	Item REI No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
T_{Si03}	84.	My beliefs become clearer to me when I am in nature.	2.68	.877	-.160	-.674	.655	*
T_{Si04}	85.	I feel connected to something bigger than myself when I am in nature.	2.83	.912	-.354	-.690	.685	**.652**
T_{Si05}	86.	I gain clarity on my life's purpose when I am in nature.	2.61	.876	.042	-.751	.744	**.720**
T_{Si06}	87.	Nature makes me feel connected to a larger force in life.	2.85	.868	-.388	-.496	.686	*

Table 8 (cont.)

Item Code	Item REI No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
T_{Si09}[d]	88.	I include aspects of nature in my spiritual practice.	2.48	.967	2.12	-.940	.663	*
T_{Sii01}	89.	The stresses in my life seem to go away when I am in nature.	2.84	.843	-.395	-.370	.731	**.680**
T_{Sii04}	90.	Spending time with nature helps me relax.	3.09	.809	-.730	.220	.700	*
T_{Sii05}	91.	Nature helps me calm down when upset.	3.01	.802	-.418	-.407	.724	*
T_{Sii06}	92.	I go to nature to find peace.	2.84	.868	-.187	-.809	.754	**.734**
T_{Sii07}	93.	My thoughts slow down when I am in nature.	2.87	.840	-.329	-.502	.744	**.722**
T_{Sii08}	94.	I feel at peace with myself when I am in nature.	2.90	.818	-.372	-.378	.756	*
T_{Sii09}	95.	The world's problems go away when I am in nature.	2.55	.873	.073	-.698	.717	*
T_{Sii12}	96.	I enjoy my spiritual practices in nature.	2.52	.896	.060	-.752	.643	**.635**
T_{Siii01}	97.	When in nature I feel far away from my usual obligations.	2.78	.850	-.246	-.567	.722	*

Table 8 (cont.)

Item Code	Item REI No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
T_{Siii02}	98.	I experience a sense of privacy in nature.	2.92	.854	-.472	-.358	.685	**.647**
T_{Siii05}	99.	Being in nature provides me with a sense of being away.	3.09	.801	-.658	.057	.628	*
T_{Siii06}	100.	My commitments seem to fade away when in nature.	2.58	.826	.209	-.635	.661	*
T_{Siii09}	101.	My problems go away when in nature.	2.50	.874	.098	-.675	.610	*
T_{Siii10}	102.	I go to places in nature to get away.	2.86	.821	-.320	-.424	.650	**.633**
T_{CCi01}	103.	I feel a sense of community with others when together in nature.	2.75	.851	-.178	-.624	.672	**.700**
T_{CCi02}	104.	I feel close to others when with them in nature.	2.75	.851	-.178	-.624	.672	*
T_{CCi03}	105.	Experiences with others in nature deepen my relationships with them.	2.74	.867	-.181	-.667	.695	**.709**
T_{CCi04}	106.	I feel connected to all of life when in nature.	2.59	.869	.015	-.699	.807	**.796**
T_{CCi05}	107.	Exposure to nature brings about unity with all things.	2.64	.813	-.063	-.509	.770	*

Table 8 (cont.)

Item Code	Item REI No.	Item	*M*	*SD*	Skew	Kurtosis	Item Total Correlation	Revised Item Total Correlation
T_{CCii01}	108.	When in nature I am more giving to others.	2.44	.850	.079	-.591	.657	**.643**
T_{CCii02}	109.	I feel compassionate towards others when they are with me in nature.	2.62	.853	.000	-.660	.703	**.719**
T_{CCii07}	110.	I think about others' needs when in nature.	2.55	.832	.030	-.564	.628	*****
T_{CCii08}	111.	When I am in nature, I find myself thinking about others in my life.	3.02	.837	-.511	-.366	.541	**.553**

Note. Item correlations in table represent corrected item-total correlations. Missing item in the Revised Item Total Correlation column are marked with a * to represent items dropped from scale.
[a] indicates item(s) flagged due to low corrected item total correlation ($r < .32$).
[b] indicates item(s) with low variability ($SD < .50$)
[c] indicates item(s) with high kurtosis (> 1.0).
[d] indicates item(s) with high skewness (> 1.0).

Access. The examination of the item characteristics for the proposed scale Access resulted in the flagging of ten items. They included A_{PAi01}, A_{PAi03}, A_{PAi04}, A_{PAi13}, A_{PAii01}, A_{PAii02}, A_{PAii06}, A_{SAi01}, $A_{SAiii01}$, and A_{SAiv03}. Items A_{PAi01} (*M* = 3.76, *SD* = .555; *Standardized Skew Index* (*SSI)* = -2.741; *Standardized Kurtosis Index* (*SKI)* = 8.700; *r* = .265) and A_{PAi13} (*M* = 3.52, *SD* = .726; *SSI* = -1.517; *SKI* = 1.920; *r* = .396) possessed low variability, high kurtosis and skewness, and low corrected item correlations. Both items were dropped on account of these item statistics. Item A_{PAi13} was also identified as

being redundant with another item, contributing to it being dropped. Item $A_{SAiii01}$ (*SSI* = -1.251; *SKI* = 1.241; *r* = .389) had a low item-total correlation, high skewness, and high kurtosis. This item was dropped the scale as a result. It was also deemed that this item was confusing and ambiguous, providing added weight for it being dropped. Items A_{PAi03} (*M* = 3.38, *SD* = .689) and A_{PAii06} (*M* = 3.40, *SD* = .686) had low variability. Item A_{PAi03} was retained as worded and item A_{PAii06} was deleted from the scale since it was deemed confusing by the researcher and dissertation committee member. Items A_{PAi04}, $A_{PAii02,}$ A_{SAi01}, and A_{SAiv03} (.359, .199, .366, and .286 respectively), were found to have low item-total correlations. A_{PAi04} was dropped as it could have multiple interpretations; item A_{PAii02} was dropped as it was found to be redundant; the wording of A_{SAi01} was modified; and A_{SAiv03} was dropped. Lastly, item A_{PAii01} (*M* = 3.34, *SD* = .675; *r* = .338) was identified as having low variability and a low corrected item total correlation. It was also dropped on account of redundancy. After additional careful consideration, the researcher and a member of his dissertation committee decided to drop A_{PAii08}, A_{SAi01}, A_{PAi02}, A_{PAi17}, A_{SAii03}, A_{SAii08}, $A_{SAiii09}$, $A_{SAiii12}$, A_{SAiv01}, A_{SAiv05}, A_{SAiv11}, and A_{SAiv12} from the Access subscale on account of redundancy, inappropriate item placement on the scale, and extreme or atypical thoughts, feelings, or behaviors represented in an item. The modified corrected item total correlations are located in Table 6. As expected, most item-total correlations were reduced in magnitude since the scale was cut nearly in half. A total of 22 items were retained on the scale following item reduction. Appendix K includes an item matrix that includes items and the item modifications based on the decision made by the researcher and his dissertation committee member.

Environmental identity. The examination of the item characteristics for the proposed scale Environmental Identity resulted in the flagging of 23 items. They included EI_{Ci01}, EI_{Ci03}, EI_{Ci06}, EI_{Cii02}, EI_{Cii03}, EI_{Cii04}, EI_{Cii05}, EI_{Cii06}, EI_{Ciii05}, EI_{Pti01}, EI_{Pti04}, EI_{Pti11}, EI_{Ptii01}, EI_{Ptii02}, EI_{Ptii03}, EI_{Ptii04}, EI_{Ptii05}, EI_{Ptii10}, EI_{Ptii11}, EI_{Pv03}, EI_{Pv04}, EI_{Pv06}, and EI_{Pv09}. Items EI_{Ptii04} (*M* = 3.42, *SD* = ..655; *SSI* = -1.034; *SKI* = 1.342; *r* = .235) and EI_{Ptii11} (*M* = 3.40, *SD* = ..729; *SSI* = -1.132; *SKI* = 1.055; *r* = .386) possessed low variability, high kurtosis and skewness, and low corrected item correlations. Both EI_{Ptii04} and EI_{Ptii11} were retained since they were viewed as being vital to the construct by the researcher. Item EI_{Ptii03} had a low item-total correlation, high skewness, and high kurtosis (*SSI* = -1.199; *SKI* = 1.134; *r* = .217). It was dropped on account of ambiguous wording. Items EI_{Ci01} (*M* = 3.20, *SD* = .738), EI_{Ci06} (*M* = 3.24, *SD* = .748), EI_{Cii02} (*M* = 3.13, *SD* = .744), EI_{Cii03} (*M* = 3.18, *SD* = .743), EI_{Cii04} (*M* = 3.16, *SD* = .746), EI_{Cii05} (*M* = 3.29, *SD* = .679), EI_{Cii06} (*M* = 3.09, *SD* = .742), EI_{Ciii05} (*M* = 3.04, *SD* = .739), EI_{Pv03} (*M* = 3.10, *SD* = .737), and EI_{Pv04} (*M* = 2.88, *SD* = .720) had low variability. EI_{Ci01}, EI_{Cii02}, EI_{Cii03}, EI_{Cii05}, EI_{Cii06}, EI_{Ciii05}, were dropped due to redundancy with other items. Items EI_{Cii04} and EI_{Pv03} were kept as originally written. Item EI_{Ptii01} (*SSI* = -1.052; *r* = .139) and EI_{Ptii10} (*SSI* = -1.074; *r* = .198) were identified as having high skewness and a low corrected item total correlations. The wording of EI_{ptii10} was adjusted and EI_{Ptii01} dropped. Items EI_{Pti01}, $EI_{Ptii01,}$ EI_{Pti04}, EI_{Pti11}, EI_{Ptii05}, EI_{Pv06}, and EI_{Pv09} were found to have low item-total correlations (.294, .316, .301, .227, .352, and .365, respectively). Items EI_{Pti01} and EI_{Ptii01}were retained since they were seen as core to the scale and items EI_{Pti04}, EI_{Pti11}, EI_{Ptii05} were dropped. The wording of EI_{Pv06} was modified and EI_{Pv09} was kept as written. Item EI_{Ptii02} (*M* = 3.28, *SD* = .691; *r* =

.223), was identified as having low variability and a low corrected item total correlation and was reworded as it was viewed as being vital an assessing the construct. The researcher and a member of his dissertation committee reviewed the remaining items and decided whether to drop the items, change the wording, or leave as is. After careful consideration, the researchers decided to remove items EI_{ci01}, $EI_{Civ05,}$ EI_{Ci05}, $EI_{Ci03,}$ EI_{Ciii03}, EI_{Ciii09}, EI_{Civ01}, EI_{Civ06}, and $EI_{Ptii05.}$ These were also deleted on account of redundancy with other items. The modified corrected item total correlations are located in Table 7. Some item-total correlations decreased in magnitude while others increased. After the deletion of items, a total of 26 items remained on the scale. Appendix K includes an item matrix with the item decisions and modifications based on the decisions made by the researcher and his dissertation committee member.

Transcendence. The examination of the item characteristics for the proposed scale Transcendence resulted in the flagging of one item, T_{Si09}. Item T_{Si09} (*SSI* = 2.12) was flagged for high skewness. The researcher and a member of his dissertation committee chose to delete the item. All other item statistics were found to be within the stringent criteria set by the researcher. The researcher and his dissertation committee member then deleted 15 items from this scale that they deemed redundant with other items or confusing. They included T_{Si03}, T_{Si06}, T_{Si09}, T_{Sii04}, T_{Sii05}, T_{Sii08}, T_{Sii09}, T_{Siii01}, T_{Siii05}, T_{Siii06}, T_{Siii09}, T_{Siii10}, T_{CCi02}, T_{CCi05}, and T_{CCii07}. After the deletion of items, a total of 14 items remained on the scale. The modified corrected item total correlations are located in Table 8. As expected, some item-total correlations decreased in magnitude while others increased. Appendix K includes an item matrix with the item decisions and

modifications based on the decisions made by the researcher and his dissertation committee member.

Modified reliability and sum-score analyses. The revised corrected item total correlations are located in Tables 6–8. In addition, modified internal consistency reliabilities for the REI subscales are located in Table 9. All scale Cronbach's alphas decreased with nearly half of the items being deleted. The decrease in the total-item correlations suggests weaker scales, but a primary goal of this pilot study was to decrease the number of redundant and statistically weak items. The scale Cronbach's alphas were still within an acceptable range and are as follows: Overall EcoWellness, .96; Access, .93; Environmental Identity, .89; and Transcendence, .93.

Table 9

Modified Internal Consistency Reliability for Overall EcoWellness and Proposed Scales and Sub-scales

Scale	Number of Items on each Scale	Cronbach's Alpha
Overall EcoWellness	**62**	**.96**
Access	**22**	**.93**
Physical Access	6	.83
Sensory Access	16	.91
Environmental Identity	**26**	**.89**
Connection	11	.91
Protection	9	.70
Preservation	6	.75
Transcendence	**14**	**.93**
Spirituality	8	.90
Community Connectedness	6	.88

Finally, correlations between the sum-scores of the different scales are similar in magnitude (see Table 10). Once again, the researcher found that all three of the proposed subscales were significantly related an alpha level of less than .05. The highest disattenuated correlation was found between Access and Environmental Identity ($r_{x'y'}$ = .89, $p < .05$), with such a strong disattenuated correlation suggesting that the Access and Environmental Identity may assess the same trait. Transcendence was correlated with Access ($r_{x'y'}$ = .73, $p < .05$) and Environmental Identity ($r_{x'y'}$ = .81, $p < .05$), possibly suggesting that Transcendence is a distinct trait from Access and Environmental Identity. As stated previously, caution should be employed when interpreting these correlations, as no standard disattenuated correlation coefficient for discriminate validity has been established in the literature. In summary, a reduced 62-item REI tentatively maintains acceptable reliability, although discriminant validity remained the same. Field-testing with a larger sample size was conducted prior to any inferences being made with the REI.

Table 10

Modified Internal Consistency Coefficients, Pearson's *r* Correlations, and Disattenuated Correlations between the Sum Scores of the Proposed Subscales of EcoWellness

Proposed Scale	Access	Environmental Identity	Transcendence
Access	.93	.89	.73
Environmental Identity	.82	.89	.81
Transcendence	.68	.74	.93

Note. Cronbach's alphas appear on the diagonal, disattenuated correlations are listed above the diagonal, and Pearson's r correlations appear below the diagonal.

Open-ended participant feedback. After the researcher and a member of his dissertation committee reviewed flagged items, the researcher considered the open-ended feedback offered by the participants in revising the directions and items. The first feedback the researcher considered consisted of the laughter that certain items in the instrument provoked during administration. For example, the first class the researcher administered the assessment to, several groups of students laughed while taking the REI, quoting certain items and joking with one another about the items. Such non-written feedback was pertinent to the development of the instrument and was taken in consideration in revising items. No major changes were made from the observation that some participants found items funny, although participant reactions to the REI items will be noted in the field study.

In the written feedback, participants reported specific items that were confusing to them. They included REI item numbers A_{PAi02}, A_{PAi19}, EI_{Ci01}, EI_{Ci03}, EI_{Cii02}, EI_{Cii06}, EI_{Ciii03}, EI_{Ciii05}, EI_{Ciii06}, EI_{Pti10}, T_{Sii09}, and T_{Siii09}. The researcher and a member of his dissertation committee either changed the wording, dropped, or left the item as is after considering participant feedback. Items A_{PAi19}, EI_{Ci03}, EI_{Ciii06}, and EI_{Pti10} were retained as written, as the researcher believed these items are core to the construct while all others were deleted from the assessment. In addition, many participants shared the sentiment that the REI was too long and that many items were redundant.

Many participants indicated that they did not understand the meaning of the word “nature” and that the word itself was used too much throughout the items. The researcher sought to find greater balance in the items included in the revision of the REI through

revising and dropping items. Also, although nature was defined in the directions it was apparent that respondents either did not read the definition or they needed reminders throughout the assessment about the definition of nature. Thus, the researcher has decided to write the nature definition in bold and underlined on the directions.

Some participants also believed that they required a neutral response to items. Despite this feedback, the researcher has decided to maintain the use of a 4-point Likert scale as it appeared to have prompted greater variability in item responses. He has decided, however, to adjust “Agree” and “Disagree” to “Somewhat Agree” and “Somewhat Disagree” to soften the tone of the Likert-type responses. The softer language may make it easier for participants to endorse items as agree or disagree when they feel neutral about a certain item. In addition, some participants shared perspectives around the appropriateness of an agree/disagree Likert-scale when answering some items, indicating that such a scale was not always appropriate for the items. The researcher and a dissertation committee member considered this feedback when adjusting the wording of items or removing others from the instrument so that all items fit under the strongly disagree to strongly agree scale.

Overall, participants seemed to understand the directions of the REI. However, nearly half of the sample did not complete birthdate information and an additional 20-25% of participants did not complete the demographic items. Initially, the researcher thought he might place the demographic questionnaire at the beginning of the assessment packet. After further consideration and discussion with his dissertation committee chair,

he has decided to maintain the demographic questionnaire at the end of the assessment, as this placement is typical with survey research.

Finally, one piece of feedback has stuck with the researcher. One participant stated concern that although EcoWellness included a description of wellness in its definition, the REI did not actually include any items explicitly prompting respondents to consider one's level of wellness as it pertains to nature. After contemplation, the researcher has decided the items of the REI indirectly assess correlates of wellness. The items in the assessment were developed to explore the thoughts, feelings, and behaviors that have previously been associated with one's connection with nature in the interdisciplinary research. It appears that just by taking the REI, different thoughts, feelings, and potential actions related to wellness were sparked. For example, one person was reminded about his or her connection to nature stating, "It makes you realize how well you're connected to nature." Another participant pointed out her or his need to get out in nature more reporting, "It makes me want to go hiking." Finally, the REI initiated several participants' thoughts in regard to one's connection with nature. One person shared, "It made me really think if I actually took time to spend time in nature and really listen to it." Another person noted how his or her thoughts would be impacted following the assessment stating, "I will think about nature more and where I go that it surrounds me." Thus, just by taking the REI, several participants seemed to have benefited in some way.

Step 6: Field Testing, Analysis, and Adjustment of Items

After modification of the REI following the pilot study, a field study was conducted online using Qualtrics to test for the initial validity and reliability of the instrument. Following data collection, the researcher evaluated the items for validity and reliability, and adjusted the items in preparation for future testing (Crocker & Algina, 1986; DeVillis, 2003). In particular, the field testing process included the administration of items with a simple random sample from the national research recruiting website Researchmatch.org. DeVillis recommended that two forms of validation be used. First, an assessment of social desirability was utilized in determining whether participants' responses were based in a need to be viewed as socially desirable. A shortened version (i.e., 10 items) of the Marlowe-Crowne Social Desirability Scale-Short form (M-C SDS; Crowne & Marlowe, 1960) was used in this study (M-C 1(10); Strahan & Gerbasi, 1972). Second, construct validity was explored through confirmatory and exploratory factor analyses in determining whether the proposed underlying constructs of EW relate in ways that have been hypothesized by the researcher. In addition, Devillis (2003) suggested that construct validity be further tested through the integration of instruments that include closely related constructs to the instrument being developed. In this case, the 5F-Wel (Myers & Sweeney, 2005b) was utilized since the EcoWellness construct has been based on holistic wellness concepts in counseling (Reese & Myers, 2012). All aspects of the field study methodology are described, including participants, instrumentation, procedures, and data analyses.

Participants. Tinsley and Tinsley (1987) recommended that the researcher utilize five to ten participants per item included in an assessment when factor analytic methodology is utilized. They suggested that once 300 participants are reached, however, the requirement of 5-10 participants is relaxed. Comrey (1988) believed that having a sample size of 200 participants when evaluating a 40-item measure was sufficient. In contrast, Guadagnoli and Velicer (1988) suggested that a sample size of 150 suffices in obtaining a stable and accurate solution if the construct has at least ten variables and is well constructed. It was decided prior to the study that the sample would include a minimum of 300 participants. Since results from the pilot study demonstrated a full range of variability in items and were not overly skewed or kurtotic, a maximum likelihood approach to confirmatory factor analysis (CFA) was utilized in the field study.

ResearchMatch.org was used in obtaining the sample for this research study. At the time of data collection, the population of ResearchMatch.org included nearly 30,000 volunteer research participants. The researcher recruited a simple random sample from the national research database, ResearchMatch.org, representing the 50 United States and the District of Columbia. Forty percent of the 30,000 volunteers (N = 11,114) were informed about the study by ResearchMatch.org to ensure that a sample of 300 participants was attained for the study. From the initial email contact, a study sample of 1,136 participants requested to be contacted directly by the researcher for recruitment. A description of the resulting study sample is included in Chapter IV.

Instrumentation. Several assessments were included in this study in testing the validity and reliability of the REI. They included the REI, the 5F-Wel (Myers &

Sweeney, 2005b; see Appendix M for permission for use from the instrument authors), and Strahan and Gerbasi's (1972) M-C 1(10). Each assessment and its properties are described.

REI. EW is the extent to which one experiences holistic wellness through their connection with nature (Reese & Myers, 2012). The REI has been created for the purposes of this study (see Appendix D) and the initial version consisted of 148 items intended to assess one's perception of EcoWellness. After expert the review, a 111-item version of the REI was administered to 264 participants using a college sample. The scale internal consistency reliabilities were as follows: EcoWellness, .95, Access, .89, Environmental Identity, .90, and Transcendence, .93. Following the pilot study, the REI was reduced to 62-items to be tested for reliability and validity in the proposed field study. The measure has been described as including the following three subscales: access, environmental identity, and transcendence. It was posited that seven components lie at the foundation of these dimensions. Access was conceptualized as having the underlying components of physical and sensory access. Environmental identity was explained as including the components of connection, protection, and preservation. Transcendence was described as including the components of spirituality and community connectedness. These underlying dimensions and components of EcoWellness were developed from a thorough review of the literature elsewhere (Reese & Myers, 2012) and built upon in Chapter II. The proposed subscale definitions were described in Chapter I. After structural testing through both CFA and EFA in the field study, an alternative second-order factor structure has been identified. One item was dropped, resulting in a

61-item measure. The internal constancy reliabilities for this study were calculated as the following: EcoWellness, .95, Sensory Access, .91, Physical Access, .81, Protection, .71, Preservation, .79, Spirituality, .90, and Community Connectedness, .88. Scale determination will be reported in Chapter IV.

The REI includes Likert-style statements on a 4-point scale, asking participants to Strongly Disagree, Somewhat Disagree, Somewhat Agree, or Strongly Agree. A four-point Likert scale was utilized to increase variability within rater responses (Dawis, 1987). The REI includes a broad range of possible scores for each of the subscales of the REI and an overall score of EcoWellness. Mean item ratings for each scale were created and modified using a linear transformation (i.e., taking the average scale/subscale score and multiplying by 25) to make the scales comparable with each other. Higher scores indicate a stronger sense of EW. Each of the items has been through expert review and piloted for relationships between items, subscales, and reliability.

5F-Wel. Reese and Myers (2012) developed EW within the context of holistic wellness models of counseling. Given that they even described EW as the missing link in holistic models of counseling, it makes logical sense to compare a measure of EW to a measure of wellness in its validation. To date, only one evidence-based model of wellness has been developed within the counseling profession, the IS-Wel, and the authors of this model have operationalized it through an assessment (Myers & Sweeney, 2008). Hence, in this study the REI included comparisons with a measure of holistic wellness based in counseling.

Holistic wellness has been defined as living life optimally where body, mind, and spirit are integrated together to allow the person to live more fully (Myers et al., 2000). Wellness is a holistic construct containing several dimensions of overall health indivisible within the self (i.e., the whole is greater than the sum of its parts). Holistic wellness is operationalized as the IS-Wel (Myers & Sweeney, 2008) and more specifically, the IS-Wel is assessed through the 5F-Wel (Myers & Sweeney, 2005b). The 5F-Wel assesses the five second-order factors of wellness, 17 third-order factors of wellness, and one overarching factor, the Indivisible Self. The 5F-Wel also includes chronometrical contexts (e.g., local, instructional, global, and chronometrical); however, these contexts have received little attention in empirical studies. The Coping Self allows the individual to survive and thrive through difficult life circumstances and includes leisure, self-worth, stress management, and realistic beliefs. The Creative Self includes the third order factors of thinking, emotions, control, work, and positive humor. It is the unique combination of individual characteristics that enables each of us to create an inimitable space with others. The Social Self is the perception of social support through friendship, family relationships, and love relationships. It includes two of Adler's life tasks, love and friendship. The Essential Self incorporates the lenses through which one makes meaning out of life experiences. It comprises the third order factors of spirituality, gender identity, cultural identity, and self-care. The Physical Self is defined as the biological and physiological processes that assist an individual in experiencing physical health. It includes the third order factors of exercise and nutrition.

The 5F-Wel (which was described in great detail in Chapter II) includes 73 attitudinal and behavioral statements (e.g., "I am an active person") which respondents rate using a four point Likert-type scale ranging from strongly agree, agree, disagree, and strongly disagree. Mean item ratings for each scale are computed and modified using a linear transformation to make the scales comparable with each having a range from 25 to 100. Reliabilities for the five scales were reported by Myers and Sweeney (2005b) as follows: Total Wellness, .98, Creative Self, .96, Coping Self, .89, Social Self, .96, Essential Self, .95, and Physical Self, .90. Cronbach's alphas for the 17 third order factors ranged from .82 to .95, excluding realistic beliefs, which was reported as .58. The second order factors loaded onto the single wellness factor with standardized coefficients spanning .51 to .98. The third order factors loaded onto the second order factors with standardized loadings ranging from .35 to .91. Eigenvalues for the first and second order factors included the following: Total Wellness, 3.16, Creative Self, 2.95, Coping Self, 2.00, Social Self, 1.35, Essential Self, 1.72, and Physical Self, 1.07. The single wellness factor, the Indivisible Self, accounted for a 63% of the variance within the model. In the study at hand, the internal consistency reliabilities were calculated as follows: Total Wellness, .94, Creative Self, .86, Coping Self, .87, Social Self, .88, Essential Self, .85, and Physical Self, .89. Cronbach's alphas for the 17 third order factors ranged from .36 to .93. Only the Total Wellness scores were utilized in the data analyses of this study.

Marlowe-Crowne 1(10). Strahan and Gerbasi's (1972) M-C 1(10) is a ten-item social desirability measure (see Appendix L). Scores range from one to ten and respondents answer it on a true-false scale (e.g., "I am always willing to admit it when I

make a mistake"). The higher the score, the greater the level of socially desirable responding. Strahan and Gerbasi described the assessment as a short, homogenous version of the M-C SDS (Crowne & Marlowe, 1960), which is a 33-item measure of social desirability. Strahan and Gerbasi reported the Kuder-Richardson formula 20 (K-R 20) reliability as ranging between .59 and .70. Correlations between the M-C SDS and M-C 1(10) ranged between .80 and .90. Fischer and Fick (1993) more recently reported internal consistency reliability of .876 for the M-C 1(10). These authors also reported a correlation between the M-C SDS and M-C 1(10) as .968. The shorter version of the Marlowe-Crowne instrument is used in the proposed field study instead of the longer version to reduce the number of items participants need to complete since both the REI and 5F-Wel are quite long. The Cronbach's alpha internal consistency reliability coefficient for this field study was .65 and will be further reported in Chapter IV.

Demographics. The demographics form that is included in the 5F-Wel will be utilized for the proposed field study. Participants are asked to report their gender, primary race/ethnicity, sexual orientation, marital status, highest level of education completed, status as a student, type of advanced degree completed (if any), state/district of residence, and employment status. In addition, the three additional questions utilized in the pilot study will also be included for exploratory purposes in the field study (e.g., "What is the average number of hours you spend in or with nature each week?").

Procedures. After obtaining approval from the IRB, the researcher uploaded the assessments and demographics questions into Qualtrics. After the survey was prepared, participants from ResearchMatch.org were randomly selected and contacted. At the time

of data collection, the membership of the Researchmatch.org population included nearly 30,000 persons from the 50 United States and District of Columbia. These members included persons who volunteer to complete IRB-approved research studies of interest. The researcher randomly selected 40% (n = 11,114) of the population ages 18 and older (from all 50 states and District of Columbia) by using the website's simple random sampling procedures. Researchmatch.org then contacted these randomly selected persons with an IRB-approved statement developed by the researcher to inform potential participants of study details (see Appendix N). Participants then opted "yes" or "no" when indicating whether they wanted to be contacted directly by the researcher. The researcher contacted 1,136 participants indicting interest in receiving more information about the study. The researcher then recruited participants via email on three separate occasions (i.e., an initial email contact and two reminder emails) across a two-week time span (see Appendix O).

Since the IRB exempted this study from requiring a signed informed consent document from each participant, informed consent was implied through participation. Following completion of the study, participants were given the opportunity to enter their email addresses for a chance to win one of six $50 Apple gift cards. The first section of the Qualtrics survey included the REI and the second section included the Five-Factor Wellness Inventory (5F-Wel). The final sections included the M-C 1(10) and demographic questionnaire. To protect the identity of the participant, only email addresses were collected. Email addresses were assigned a number and the numbers were entered into an Excel spreadsheet separate from the email addresses. Six random numbers

were identified utilizing Excel and the winning participants were contacted for physical addresses to send the gift cards. After the gift cards were distributed to the winners of the raffle, all email addresses and any correspondences between the researcher and the email addresses were destroyed.

Data analyses. After the development and field-testing of the REI, confirmatory and exploratory factor analyses (EFA and CFA) were utilized in assessing the factor structure, reliability, and validity of the REI. The researcher first uploaded the data into SPSS after receiving the data from Qualtrics. Data analyses were conducted in SPSS (Version 20) and Lisrel (Version 8.80). First, the data were scanned for any missing information. Of those participants that began the REI (n = 853), all of them completed it. Meaning, there were no missing data for the REI. Next, to correct for any multivariate non-normality in the raw data, both a covariance and asymptotic covariance matrix were calculated in preparation for the CFA analyses. A CFA testing the lower level factor structure (i.e., the seven first-order factors) was then run. The researcher utilized a maximum likelihood approach to CFA since minimal skewness was noted on the item distributions for the initial item pool in the pilot study. The ML approach to CFA provided the researcher with the ability to use a range of goodness of fit indices in assessing model fit and this approach to model testing also allows statistical significance testing of factor loadings and calculating correlations between factors (Fabrigar, Wegener, MacCallum, & Strahan, 1999). After assessing the model fit of the lower-level factor model (i.e., Chi square, RMSEA, CFI, and SRMR), the researcher attempted running a CFA with a higher order factor structure. The model was not able to compute

given high correlations between the lower-level factors and an EFA was run utilizing the correlation matrix of the lower-level factors to determine an alternative factor structure. Since the three-factor CFA model could not run on account of high correlations between the lower level factors, the researcher ran an EFA using the correlation matrix between the seven highly correlated lower-level factors in SPSS. An oblique (e.g., oblimin) rotation was utilized since orthogonal (i.e., verimax) rotations typically "result in the loss of valuable information if the factors [in actuality] are correlated" (Costello & Osborne, 2005, p. 3). After the EFA was run, eigenvalues of 1.0 and greater were considered. Factor loadings with eigenvalues below 1.0 were automatically dropped (Costello & Osborne, 2005). A scree plot was then utilized and the "elbow rule" was applied to the plot. Any factors loading below an elbow were not retained. A single factor accounted for much of the variance and an alternative second-order factor structure was then tested using a CFA. After the second-order CFA was run, the model fit was determined (i.e., Chi square, RMSEA, CFI, and SRMR). The patterns and statistical significance ($p < .05$) of the standardized loadings for each item on the factors were noted. Although loading magnitude and significance were considered, for research purposes the evaluation of patterns of the loadings was considered more important for this phase of instrument development. The proportions of variance accounted by each factor within the second-order model were determined and they are reported in Chapter IV.

Items with low factor loadings were dropped from the REI or modified as described in the pilot study in pursuit of a valid and reliable measure of EW. In addition, mean item ratings on each factor were created and modified using a linear transformation

to make the scales comparable with each other (by multiplying each mean scale rating by 25). The mean across scale totals were added together and multiplied by a constant (i.e., multiplied by 25) in the creation of a total score for the REI. Scale and subscale scores ranged between 25 and 100.

Several other additional analyses were run in testing the validity and reliability of the REI. The REI total score and scales were assessed for reliability. Within this study, reliability was measured through internal consistency, the consistency with which respondents answer items. Cronbach's alpha, which is an index of internal consistency, is a measure of the intercorrelations between the test items. An internal consistency between .8 and .9 was desired for this study, as it would demonstrate "good" internal consistency (Cronbach & Shavelson, 2004). It was assumed within this measurement of reliability that items possessed random error, that this random error was equal, and that the errors of each item were not correlated (D. C. Howell, 2010). Where high reliability could not infer validity of EcoWellness (Cronbach & Shavelson, 2004), it did affirm that participants responded to questions in a consistent, uniform manner, suggesting that a unitary construct was being measured.

D. T. Campbell and Fiske (1959) argued for a multitrait-multimethod (MTMM) approach in determining convergent and discriminant validity. Such an approach included at least two traits with at least two different methods of measurement in validating a construct. The assumption is that similar traits will correlate more highly with one another than other traits measured with a different methodology. A major limitation of this approach in the social sciences is that traits, especially latent variables,

cannot always be measured with multiple methods. Therefore, discriminant and convergent validity were measured using related constructs (e.g., convergent validity) and constructs that should minimally be related. Discriminant validity was assessed through the calculation of disattenuated correlations in comparing the REI subscales with one another. Convergent validity was assessed through the ability of the REI and its subscales in predicting overall holistic wellness through the use of multiple regression.

Socially desirable responding was analyzed through calculating disattenuated correlations between the REI and its subscales with the MC 1(10). Theoretically, the correlations between the MC 1(10) should have been low and statistically insignificant. Finally, a variety of demographic factors were utilized in determining the extent to which demographic factors could predict REI and subscale scores using eight separate multiple regressions, including a Bonferonni correction (dividing .05 by eight). The research questions, hypotheses, and associated statistical analyses are depicted in Table 1 above. The specific analyses just described and the results are reported in Chapter IV.

Potential Study Confounds

Issues of reliability and validity are central to the outcomes of this study. Since a factor structure of the REI did *not* emerge as hypothesized, it may suggest an alternative organization of the dimensions of EW or that the items within the measure are somehow flawed (Crocker & Algina, 1986). The original posited factors of the REI demonstrated some overlap, providing empirical evidence that the scales consisted of related concepts. An alternative factor structure provided more distinction between the scales, but more research is required that further tests the dimensions of EcoWellness to further validate

the measure. Therefore, the findings of this study and future research utilizing the REI hinge on concepts of validity and reliability.

The researcher assumes that universal truths exist about EW. Meaning, across populations it is hypothesized that certain aspects of nature impact certain components of perceived wellness and that particular aspects of EcoWellness exist for each individual. However, participants in the pilot study include those taken from convenience sample and although the field study sample was random, the participants of the study still self-selected themselves. The results of the study will only be representative of the Researchmatch.org population. Both sampling procedures severely limit the generalizability of the studies and increased the likelihood of sampling error accounted for by variables not explicitly assessed for in the study (e.g., greater risk to a cohort effects). Therefore, the ability for the EcoWellness measure to describe variance within the either sample may be limited and could ultimately impact the validity and reliability of both studies.

Lastly, the pilot study took place in the southeast United States. Persons who complete the REI in this part of the United States may respond to items differently than persons in other parts of the country (e.g., Pacific Northwest). Although participants represented many different geographical locations in the field study, the focus of the field study was to begin exploring the validity and reliability of an EcoWellness measure, and more studies will be needed with different populations in different regions of the country to assess the model's universality and/or unique features across their unique cultures.

Chapter Summary

The pilot study provided several important insights into the development and validation the REI. First, the initial item analyses demonstrated high variability, mixed discriminant validity, generally high corrected item-total correlations, and high internal consistency reliability of the scales. In addition, 49 items were removed from the REI following the pilot study in response to items with low variability, high kurtosis and/or skewness, participant feedback, and redundancy within items. The REI was developed to include a preponderance of redundant items to determine which items were most interpretable to participants and statistically the strongest. After item reduction, the instrument maintained sufficient internal consistency reliability (all with Cronbach's alphas near or above .90) and mixed discrimination between scales. A field study with a larger sample size was conducted to provide greater clarity into the reliability and validity of the REI. At the conclusion of the pilot study, it was determined that a maximum likelihood approach was appropriate for the field study, as most items of the instrument possessed a high range of variability.

Furthermore, the open-ended feedback provided by participants in the pilot study informed several modifications to the REI instructions and items. Changes were made in preparation for the field study to increase clarity into the instructions and ease of taking the assessment. First, the definition of nature was underlined and bolded in the REI instructions. Second, although the researcher did not add a neutral response to Likert-responses, he adjusted the Likert responses of "Agree" and "Disagree" to "Somewhat Disagree" and Somewhat Agree" in response to many participants who desired a neutral

response. Making such a change may have provided participants with softer options for answering items. By applying what was learned through the pilot study, the researcher anticipated that the validity and reliability of the REI would be tested with increased precision and reduced error in the field study.

CHAPTER IV

RESULTS

Chapter III included a description of the six steps of this study's instrument development methodology. The study research questions, associated hypotheses, and statistical analyses were introduced. A pilot study was reported that assisted the researcher in adjusting the REI and study methodology in preparation for the field study. In this chapter, the results of the data analyses introduced in the previous chapter are reported. First, the characteristics of the research sample are described. The description of the sample is followed by several data analyses broken down by the seven research questions proposed in Chapter III.

Description of Participants

The researcher directly recruited a total of 1,136 potential participants from Researchmatch.org for the purposes of this study. A total of 853 participants (76%) of the targeted sample completed the REI. Approximately 70% (n = 792) completed both the REI and the 5F-Wel, and a total of 782 (69%) participants completed the entire study, including the demographics section. The final response rate for the study is thus 69%. It should be noted that a total of ten email addresses were redundant when the researcher randomly selected winners for the gift cards. Meaning, at least ten participants completed the study twice. Such a result may serve as a limitation to the validity of the study and will be discussed further in Chapter V.

Demographic data for the field study are reported in Table 11. All participants were at least 18 years of age. For persons reporting, ages ranged between 19 and 84 years with the mean age of approximately 41.5 years (*SD* = 14.7). The median age was approximately 36 years. The majority of participants in the sample were married/partnered (51.1%), 26.5% identified themselves as single, 1.6% identified as separated, 10.7% reported being divorced, and 1.8% reported being widowed. Approximately 57.7% of participants were employed full time, 14.9% were employed part time, 5.4 % identified as being retired and not working, 3.3% reported being retired and working part time, and 10.4% reported not working.

Roughly 0.1% of the sample reported being in high school, 6.8% reported working on an undergraduate degree, 13.6% reported working on a graduate degree, and 66.4% reported not currently being a student. About 10.7% of the sample indicated that high school was their highest level of education, 9.5% reported having a trade, technical, or associates of arts degree, 34.5% reported having a bachelor's degree, and 36.0% of the sample reported having an advanced degree. About 29.4% of the sample reported having a master's degree, 6.2% described having a specialist degree, 3.2% reported earning a professional degree (i.e., DDS, JD, or MD), and 7.6% reported having an earned doctorate degree.

The majority of the sample reported their biological sex as female (77.1%) and 14.5% identified as being male. About 1.4% of the sample identified their sexual orientation as gay, 1.5% identified as lesbian, 5.2% identified as bisexual, and 83.6% identified as heterosexual. Only 3.4% of the sample identified as biracial.

Table 11

Field Study Participant Demographics

Demographic/Characteristic	*n*	%*
Marital Status		
Married/Partnered	436	51.1
Single	226	28.9
Separated	14	1.6
Divorced	91	10.7
Widowed	15	1.8
Employment Status		
Employed Full Time	492	57.7
Employed Part Time	127	14.9
Retired, not working	46	5.4
Retired, working part time	28	3.3
Not working	89	10.4
Student Status		
Yes, in high school	1	0.1
Yes, working on an undergraduate degree	58	6.8
Yes, working on a graduate degree	116	13.6
Yes, taking a course for fun	41	4.8
No, not currently a student	566	66.4
Highest Education		
Less than high school	0	0.0
High school graduate	91	10.7
Trade/technical school/A.A.	81	9.5
Bachelor's Degree	294	34.5
Advanced Degree		
Master's Degree	251	29.4
Specialist Degree	53	6.2
Professional degree (DDS, JD, MD)	27	3.2
Doctorate degree (Ph.D., Ed. D)	65	7.6

Table 11 (cont.)

Demographic/Characteristic	*n*	%*
Biological Sex		
Male	124	14.5
Female	658	77.1
Biracial		
Yes	29	3.7
No	753	88.3
Primary Cultural Background		
Native American	7	0.9
Asian or Pacific Islander	27	3.5
African American	38	4.9
Caucasian	696	89.0
Hispanic/Latino/Latina	14	1.8
Sexual Orientation		
Gay	12	1.4
Lesbian	13	1.5
Bisexual	44	5.2
Heterosexual	713	83.6

**Note.* Percentages on each demographic do not sum to 100 due to missing data.

Primary cultural background was reported as race/ethnicity. Approximately 0.8% of the sample identified as Native American, 3.2% reported as Asian or Pacific Islander, 4.5% were African American, 81.6% Caucasian, and 1.6% Hispanic, Latino, or Latina. Participants were nearly representative of the ResearchMatch.org population, of which included 79% Caucasian, 11% African American, 4% Asian, and 1% Native American

(ResearchMatch.org, 2012). It is noteworthy that African Americans were underrepresented in this study.

Participants were also presented with a definition of EcoWellness (EW) and asked to rate the current level of and importance of EW in their lives (see Table 12). Participants rated current EW level using a one to ten scale with one indicating, "the least it could be" and ten representing "the most it could be." Participant EW ratings ranged from one to ten with a mean rating of 6.5 (*SD* = 1.8). The median level of EW was 7.0. Participants also used a one to ten rating scale to report the importance of EW in their lives with one indicating "not at all important" and ten representing "very important." Responses ranged from one to ten with the mean importance of EW being 7.5 (*SD* = 2.2). The median level of importance of EW was 8.0.

Table 12

Measures of Central Tendency and Standard Deviations for Reported EcoWellness and Time Spent with Nature

Demographic	*n*	%	Range	Median	*M*	*SD*
Level of EcoWellness	778	91.2	1-10	7.0	6.5	1.8
Importance of EcoWellness	778	91.2	1-10	8.0	7.5	2.2
Hours spent with nature per week (hours)	761	88.0	0-154	5.3	10.2	14.8

Finally, participants reported how many hours they spend in nature in a typical week. Of those who reported, participants spent anywhere from 0 to 154 hours per week in nature. On average, participants spent 10.2 hours (*SD* = 14.8) with what they considered nature. The median number of hours spent with nature each week was 5.3. Such indices suggest that a many respondents reported spending time in nature lower than the mean and that several of the respondents reported extreme amounts of time spent in nature (i.e., 150 hours). It should also be noted that a number of participants included ranges of time spent in nature and some also reported that their number of hours with nature depended on the season (i.e., winter or summer). The average unit of time was utilized in determining each participant's time spent with nature when the participant reported a range of time. For example, if a participant reported spending 1–2 hours of time in nature per week, 1.5 hours was used. Thus, this particular demographic should be interpreted with caution.

Finally, participants reported their states of residence. Thirty-eight states were represented, including the District of Columbia, with two participants reporting not currently residing in the United States. The states represented in the sample are reported in Table 13. The states with the largest percentages included Ohio (17.4%), Iowa (10.9%), Tennessee (8.6%), New York (6.4%), and North Carolina (4.6%). Generally speaking, these proportions are similar to those found within the ResearchMatch.org database population (i.e., 14.1%, 5.1%, 12.5%, 7.7%, and 4.4%, respectively).

Table 13

Frequency of States Represented

State	*n*	%
Alabama	24	2.8
Alaska	1	0.1
Arizona	3	0.4
Arkansas	9	1.1
California	22	2.6
Colorado	16	1.9
Connecticut	3	0.4
District of Columbia	8	0.9
Florida	11	1.3
Georgia	13	1.5
Idaho	1	0.1
Illinois	35	4.1
Indiana	9	1.1
Iowa	85	10.0
Kentucky	3	0.4
Louisiana	2	0.2
Maryland	19	2.2
Massachusetts	15	1.8
Michigan	11	1.3
Minnesota	30	3.5
Missouri	15	1.8
New Hampshire	4	0.5
New Jersey	5	0.6
New Mexico	1	0.1
New York	55	6.4
North Carolina	39	4.6
Ohio	148	17.4
Oklahoma	2	0.2
Oregon	22	2.6
Pennsylvania	17	2.0
South Carolina	6	0.7
Tennessee	73	8.6
Texas	25	2.9
Utah	6	0.7
Vermont	2	0.2

Table 13 (cont.)

State	*n*	%
Virginia	18	2.1
Washington	12	1.4
Wisconsin	10	1.2
Not currently residing in the United States	2	0.2

Results of Hypothesis Testing

The sections that follow include the statistical results examining the seven hypotheses posited in Chapters I and III. Statistical analyses included CFA, EFA, calculation of Cronbach's Alphas, disattenuated correlations, and multiple and linear regressions (including a Bonferonni Correction in testing Hypothesis 7). Prior to hypothesis testing, the researcher conducted a number of preliminary item-level analyses to assess for non-normality within the data and tentative statistically weak items within the 62 items of the REI.

Item-level Analyses

Similar criteria were used in the field study as the pilot study in assessing the REI for non-normality and tentative statistically weak items. Items were assessed through their corrected item total correlations with the entire 62-item scale, item-level means and standard deviations, kurtosis, and skewness (see Table 14). Costello and Osborne (2005) suggested that item-total correlations be considered for dropping when below .32. After consultation with a member of his dissertation committee, the researcher chose to loosen this criterion, deciding that he would consider any item with a corrected item-total

correlation (and later, standardized factor loadings) of approximately .25 or higher. In addition, indices of skewness and kurtosis of individual items were calculated. It was determined at the conclusion of the pilot study that a maximum likelihood approach to CFA would be utilized in the field study. However, if a high number of items of the REI in the field study possessed high kurtosis (as defined by an index of kurtosis greater than 10.00) and/or high skewness (as defined by an index of skewness greater than 3.00; Kline, 2011), then the use of both a covariance and asymptotic covariance matrices would be utilized in conducting the CFA to address non-normality within the data.

Table 14

62-item REI Preliminary Item-level Analyses

Item Code	*M*	*SD*	Skew	Kurtosis	Item Total Correlation
A_{PAi03}	3.28	.751	-.836	.307	.400
A_{PAi08}	3.52	.660	-1.281	1.316	.637
A_{PAi09}	3.37	.790	-1.177	.889	.577
A_{PAi18}	3.50	.683	-1.324	1.594	.428
A_{PAi19}	3.74	.530	-2.143	4.940	.567
A_{PAi20}	3.48	.691	-1.246	1.250	.613
A_{SAi02}	3.16	.902	-.826	-.206	.573
A_{SAi06}	3.13	.867	-.736	-.222	.660
A_{SAii01}	3.13	.932	-.833	-.252	.518
A_{SAii07}	3.72	.523	-1.920	4.212	.565
A_{SAii09}	3.61	.593	-1.513	2.377	.594
A_{SAii10}	3.35	.740	-.997	.631	.621
$A_{SAiii02}$	2.80	1.016	-.366	-.990	.425
$A_{SAiii07}$	2.83	1.060	-.363	-1.141	.530

Table 14 (cont)

Item Code	*M*	*SD*	Skew	Kurtosis	Item Total Correlation
$A_{SAiii08}$	3.45	.744	-1.278	1.115	.642
$A_{SAiii10}$	3.34	.774	-.968	.251	.656
$A_{SAiii11}$	2.97	1.180	-.661	-1.133	.373
$A_{SAiii13}$	3.46	.714	-1.367	1.847	.603
A_{SAiv02}	3.22	.800	-.737	-.168	.442
A_{SAiv08}	3.71	.522	-1.738	3.006	.636
A_{SAiv09}	3.37	.752	-.964	.167	.736
A_{SAiv10}	3.55	.619	-1.327	1.886	.643
EI_{Ci02}	3.65	.563	-1.602	2.837	.655
EI_{Ci04}	3.46	.689	-1.146	.922	.691
EI_{Ci05}	2.94	.862	-.306	-.784	.614
EI_{Ci06}	2.89	.835	-.350	-.481	.669
EI_{Cii01}	3.48	.658	-1.081	.733	.744
EI_{Cii04}	3.47	.679	-1.144	1.026	.687
EI_{Cii07}	3.16	.741	-.615	.102	.739
EI_{Cii01}	3.47	.735	-1.318	1.237	.634
EI_{Ciii04}	3.45	.778	-1.334	1.066	.507
EI_{Ciii06}	3.25	.833	-.871	-.019	.586
EI_{Civ04}	2.58	.983	-.123	-.995	.688
EI_{Pti01}	3.42	.730	-1.080	.537	.387
EI_{Pti03}	3.15	.751	-.564	-.100	.465
EI_{Pti10}	2.67	.793	-.094	-.458	.256
EI_{Pti11}	3.33	.845	-1.187	.728	.248
EI_{Ptii01}	2.81	.922	-.391	-.667	.369
EI_{Ptii10}	2.50	.946	-.134	-.909	.485
EI_{Ptii02}	2.90	.835	-.449	-.310	.415
EI_{Ptii05}	3.36	.640	-.716	.495	.541
EI_{Ptii11}	3.55	.694	-1.630	2.478	.073
EI_{Pv01}	3.14	.834	-.736	-.060	.505

Table 14 (cont.)

Item Code	*M*	*SD*	Skew	Kurtosis	Item Total Correlation
EI_{Pv03}	3.41	.674	-.972	.783	.538
EI_{Pv04}	3.21	.668	-.500	.215	.540
EI_{Pv05}	3.17	.749	-.701	.322	.415
EI_{Pv06}	3.42	.773	-1.177	.668	.360
EI_{Pv09}	2.76	.739	-.196	-.218	.279
T_{Si04}	3.51	.705	-.1437	1.796	.616
T_{Si05}	3.11	.772	-.539	-.183	.631
T_{Sii01}	3.24	.725	-.852	.816	.622
T_{Sii06}	3.33	.763	-1.042	.779	.671
T_{Sii07}	3.25	.771	-.847	.327	.552
T_{Sii12}	3.12	.889	-.771	-.188	.624
T_{Siii02}	3.25	.732	-.816	.577	.563
T_{Siii10}	3.29	.788	-.936	.331	.602
T_{CCi01}	3.00	.824	-.506	-.297	.574
T_{CCi03}	3.08	.789	-.568	-.117	.599
T_{CCi04}	3.08	.802	-.632	-.026	.652
T_{CCi05}	2.68	.803	-.117	-.475	.579
T_{CCii02}	2.92	.757	-.419	-.013	.603
T_{CCii08}	3.07	.762	-.616	.223	.502

All standard deviations of the REI items were at or above .50, indicating acceptable variability within the data. Indices of skewness were all well below 3.00 and all indices of kurtosis were lower than 10.00. Since many of the items possessed negative skew, the researcher chose to include both the asymptotic covariance and covariance matrices in conducting CFA analyses to correct for moderate non-normality in the data. Furthermore, most corrected-item total correlations were at or above Costello and

Osborne's (2005) recommendation of item loadings of less than or equal to .32. Several items (EI_{Pti10}, EI_{Pti11}, and EI_{Pv09}) possessed corrected item-total correlations near .25. Item EI_{Ptii11} possessed a corrected item-total correlation of .073 and was therefore removed from all further analyses, resulting in a 61-item instrument to be tested through factor analysis.

CFA

Following the initial item-level analyses, the researcher utilized CFA and EFA in assessing Hypotheses 1 and 2. The researcher has many options when it comes to assessing factor analytic model fit. Kline (2011) argued that the researcher should report a variety of fit statistics insensitive to sample size, model misspecification, and parameter estimates. Such statistics include the Chi-square, the root mean square error (RMSEA) and its confidence interval, the standardized root mean square residual (SRMR), and the comparative fit index (CFI), among others. Some authors have suggested that RMSEA values of .08 or below demonstrate good fit (MacCallum, Browne, & Sugawara, 1996) while others (Steiger, 2007) have suggested that acceptable goodness of fit values are at or below .07. Diamantopoulos and Siguaw (2000) suggested that a SRMR value of .05 or less indicates a well-fitting model and Hu and Bentler (1999) suggested that values of SRMR as high as .08 are acceptable. Hu and Bentler indicated that a CFI of greater than or equal to .95 are representative of good fit.

Model fit indices for each CFA model are reported. For the purposes of this research, the researcher considered a model to have "good" fit when the RMSEA value (including its confidence interval) was at or below .07; the model would have

"acceptable" fit when the model had RMSEA values of .08 or lower. A model would also be considered as having "good" fit when the SRMR value was at or below .05 and "acceptable" fit when the model was between .05 and .08. Finally, a CFI index of .95 or greater would indicate "good" model fit.

Generally speaking, a statistically significant ($p < .05$) Chi-Squared test suggests that a CFA model has poor fit (Barrett, 2007). However, it is typical for the Chi-squared to be statistically significant when sample sizes are large (Jöreskog & Sörbom, 1993). Several additional indices of fit were used (i.e., RMSEA, SRMR, and CFI) in assessing a model's goodness of fit. In addition, when comparing the model fit of different CFA models, it is typical to analyze Chi-squared difference tests. When a Chi-squared difference test was statistically significant ($p < .05$), the model with the lower Chi-squared was deemed by the researcher to possess greater model fit. Kline (2011) cautioned researchers using CFA about basing the appropriateness of different factor structures strictly based on statistics. Rather, Kline suggested the interplay between a priori theoretical assumptions and CFA output, suggesting that any changes to a given factor structure should be based on both theory and statistical outcomes.

Hypothesis 1

The researcher hypothesized that an EcoWellness model with three second-order factors (i.e., access, environmental identity, and transcendence) and the corresponding seven first-order factors would exhibit adequate model fit. In order to test this model, the researcher planned to first run a CFA assessing a seven lower-level factor model (i.e., physical access (PA), sensory access (SA), connection (C), protection (Pt), preservation

(Pv), spirituality (S), and community connectedness (CC)) using LISREL followed by a CFA that tested a third-order factor structure.

Lower-level CFA. Overall, the model fit of the lower-level model demonstrated very good fit. The Chi-Square value assessing the overall model fit was statistically significant ($\chi^2(1748) = 6932.73$, $p = 0$), thus rejecting the exact-fit hypothesis. Because Chi-Square is sensitive to large sample sizes (Kline, 2011), other indices of fit were also evaluated. The RMSEA value was .059 and the 90% confidence interval included a lower bound of .058 and an upper bound of .060, suggesting some error within the model (Kline, 2001), but still indicating very good model fit. The obtained CFI test demonstrated that the lower-level factor model was a 98% improvement over that of the independence model fit. The SRMR value (SRMR = .071) was below .08, which is considered acceptable in determining model fit (Hu & Bentler, 1999). Therefore, where the Chi-Square exact fit hypothesis was rejected, a seven-factor lower-level factor structure was supported.

The standardized loadings for each of the 61-items onto its respective factor ranged from .36 and .92, indicating that each item loaded satisfactorily onto the hypothesized factors. Individual loadings for this particular model are not reported, as it is noteworthy that the correlations between the seven factors were high. Model based correlations between factors ranged from .49 to .89 (see Table 15), indicating a great deal of overlap between the constructs assessed through the factors.

Table 15

Model-based Correlation Matrix of the Proposed Lower-level CFA Factors

Proposed Factor	PA	SA	C	Pt	Pv	S	CC
PA	1.00						
SA	.84	1.00					
C	.84	.89	1.00				
Pt	.61	.70	.69	1.00			
Pv	.49	.59	.57	.87	1.00		
S	.68	.75	.84	.58	.50	1.00	
CC	.59	.68	.74	.60	.54	.83	1.00

Third-order CFA. Having knowledge that the lower-level factors possessed high correlations, the researcher attempted to assess the model fit of a higher order factor structure of EcoWellness that included the third order factor, EcoWellness, the second-order factors of access, environmental identity, and transcendence, and the seven third-order factors tested in the lower-level model. When running the third-order factor model, LISREL could not complete the analyses on account of the high correlations between the seven first-order factors. Thus, a third-order factor model of EcoWellness most likely does not exist within the population represented in this study and as measured by this instrument. Because a third-order factor structure did not emerge as hypothesized, the correlation matrix between the seven lower-level factors was used to run a principle axis EFA in SPSS to determine whether a second-order factor might account for the relationships between the lower-level factors.

EFA. A single factor of EcoWellness emerged from the EFA, accounting for approximately 73.4% of the variance within the correlated factors. This factor possessed an eigenvalue (eigenvalue = 5.14) of greater than 1.0, indicating that a second-order factor may have caused the relationships between the lower-level dimensions. A scree plot also confirmed the one factor using the "elbow rule" (see Figure 1). Each of the seven proposed lower-level scales loaded onto the single factor with high loadings (see Table 16), suggesting a second-order factor of EcoWellness.

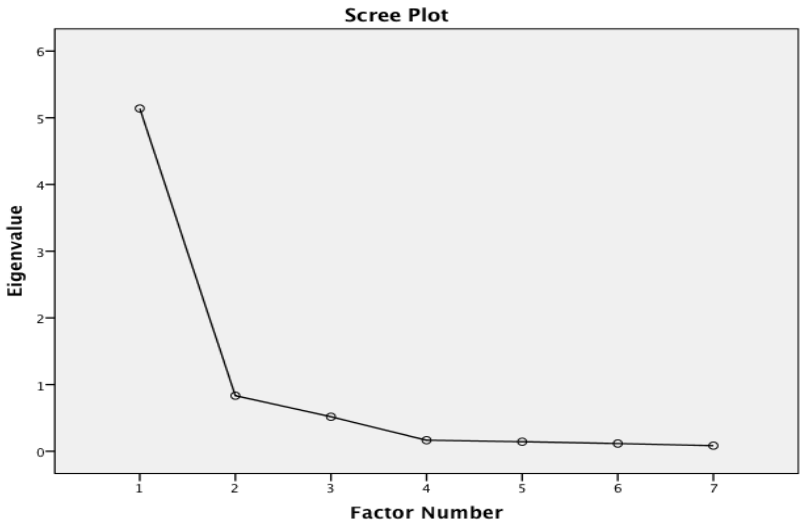

Figure 1. Scree Plot of the EFA displaying the higher order factor of EcoWellness

Thus, Hypothesis 1 gained partial support through testing the hypothesized lower-level factors and running an EFA when the third-order factor structure could not be assessed in LISREL on account of high correlations between the lower-level factors. Following these analyses, the researcher concluded that it seemed plausible that a second-

order factor of EcoWellness may exist. Thus, Hypothesis 2 was adjusted to test a second-order model of EcoWellness including the seven first-order factors.

Table 16

EFA Standardized Factor Loadings for a General EcoWellness Factor

Lower-Level CFA Factor	EcoWellness Factor Loadings
PA	.820
SA	.912
C	.944
Pt	.796
Pv	.691
S	.846
CC	.795

Hypothesis 2

The researcher originally hypothesized that a general third-order factor of EcoWellness would describe the associations among the lower order factors. He believed that the model would not possess model fit that was appreciably worse than a first-order factor model. Because a third-order factor structure did not emerge in assessing Hypothesis 1, Research Question 2 was modified. Based on the analyses run in Hypothesis 1, the researcher believed that a second-order factor structure that included a higher-order factor of EcoWellness and the seven lower-level factors would possess model fit that was not appreciably worse than a lower-level model that included the seven factors. Two additional exploratory factor structures using CFA were also assessed, given

the high correlations between the lower-level scales. The first additional exploratory CFA included the assessment of one lower-level factor of EcoWellness. The second supplemental analysis included a combination of the two most highly correlated scales (i.e., C and SA). The model fit of each factor structure is reported and comparisons between models are made between model statistics and a priori assumptions. The factor loadings and errors for the chosen model are also reported.

Second-order factor CFA. The researcher first ran a CFA assessing the factor structure of a second-order model. The model fit for this and other models are reported in Table 18. The Chi-Square value assessing the overall model fit was statistically significant ($\chi^2(1762) = 7095.15$, $p = 0$), thus rejecting the exact-fit hypothesis. The RMSEA value was .060 and the 90% confidence interval included a lower bound of .058 and an upper bound of .061, suggesting some error within the model, but still indicating good model fit. The obtained CFI test demonstrated that the lower-level factor model was a 98% improvement over that of the independence model fit. The SRMR value (SRMR = .079) was below .08, which is considered acceptable in determining model fit (Hu & Bentler, 1999). Therefore, where the Chi-Square exact fit hypothesis was rejected, a second-order factor structure of EcoWellness, including the seven original lower-level factors, was supported.

One-factor exploratory CFA. Given the high model-based correlations between the lower-level scales, a single-order CFA was run, testing the assumption that a single factor of EcoWellness would fit the data better. The Chi-Square value assessing the overall model fit was statistically significant ($\chi^2(1769) = 13037.88$, $p = 0$), thus rejecting

the exact-fit hypothesis. The RMSEA value was .086 and the 90% confidence interval included a lower bound of .085 and an upper bound of .088, suggesting a considerable amount of error within the model and indicating unacceptable model fit. The obtained CFI test demonstrated that the single-order factor model was a 96% improvement over that of the independence model fit. The SRMR value (SRMR = .084) was above .08, which is considered unacceptable in determining model fit (Hu & Bentler, 1999). Therefore, a single-order factor model of EcoWellness was not supported as compared to the original first-order factor structure.

Combined exploratory lower-level factor CFA. Given the high correlations between the lower-level factors, an exploratory CFA was run using a combination of the Spirituality and Sensory Access subscales ("Nature Identity" [NI]), which possessed the highest Pearson's *r* correlation (*r* = .89; see Table 15). Thus, a second-order CFA model with six lower-level factors was assessed. The Chi-Square value assessing the overall model fit was statistically significant ($\chi^2(1763) = 7745.67$, $p = 0$), thus rejecting the exact-fit hypothesis. The RMSEA value was .063 and the 90% confidence interval included a lower bound of .062 and an upper bound of .065, suggesting reasonable error within the model, but still indicating acceptable model fit. The obtained CFI test demonstrated that the lower-level factor model was a 98% improvement over that of the independence model fit. The SRMR was .08, which is considered marginally acceptable in determining model fit (Hu & Bentler, 1999). Therefore, where the Chi-Square exact fit hypothesis was rejected, a second-order factor structure of EcoWellness that combines the lower-level factors Connection and Sensory Access was supported.

The model-based correlations between all scales remained high (see Table 17), suggesting that regardless of how scales were combined, a large degree of overlap existed between the scales within the sample used for this study. Although many correlations between scales were decreased on account of this combination, several scales still appear to be assessing the same construct. Thus, although the model fit of a combined six-order scale is not appreciably worse, per se, the researcher is hesitant to combine the scales prior to testing the REI with different populations more representative of national distributions of demographic characteristics such as age, gender, and ethnicity.

Table 17

Model-based Correlation Matrix of Six Lower-level Factor Scales (SA and C Transformed into "NI")

Proposed Factor	PA	NI	Pt	Pv	S	CC
PA	1.00					
NI	.85	1.00				
Pt	.66	.75	1.00			
Pv	.53	.60	.47	1.00		
S	.73	.83	.65	.52	1.00	
CC	.66	.75	.59	.47	.65	1.00

CFA model fit comparisons. The researcher conducted four separate CFA's with slightly different factor structures. The CFA models and their model fit statistics have been reported. Table 18 includes the model fit statistics for each CFA model as well as a model comparison test using the Chi-square difference test (χ^2_{Diff}). Each of the four

models possessed good to acceptable model fit, with exception to the single-factor model. As reported, this CFA model possessed poor model fit. The original first-order model that included only the seven posited lower-level factors possessed the best model fit, followed by a second-order factor model that also included the seven lower-order factors. Taken together, the indices of model fit did not suggest that this higher-order model possessed model fit appreciably worse than the first order model, although the Chi-squared difference test between these higher and lower-level models suggested that the first-order model had greater model fit than that of the second-order model ($\chi^2_{Diff}(14) = 162.42$, $p < .001$).

The second-order model in which the researcher combined the Sensory Access and Connection scales (Nature Identity) did possess poorer fit than the original first-order model according to several criteria, including a significant Chi-squared difference test ($\chi^2_{Diff}(15) = 650.52$, $p < .001$). Therefore, based on a priori theory and indices of CFA model fit, the researcher chose to further report and analyze the factor structure from the second-order factor structure that included the original seven proposed lower-level subscales. Such a factor structure was exploratory given that the original three-order factor structure did not emerge from the CFA. Caution should be taken in the interpretation of this factor structure and further research with different populations is needed to confirm the factor structure of the REI.

Table 18

CFA Model Goodness of Fit Statistics for Four Factor Analytic Models

Model	χ^2	*df*	χ^2_{Diff}	RMSEA	RMSEA 90% Confidence Interval	SRMR	CFI
First-Order Model (Seven Factors)	6932.73*	1748	—	.059	.058; .060	.071	.98
Second-Order Model (Seven 1st-order Factors)	7095.15*	1762	162.42**	.060	.058; .061	.079	.98
Single-Order Factor Model (EcoWellness)	13037.88	1769	6105.15**	.086	.085; .088	.084	.96
Second-Order Model (Six1st-order Factors)	7745.67*	1763	650.52**	.063	.062; .065	.080	.98

* $p = 0$
** $p < .001$

Second-order CFA evaluation. The researcher has chosen to accept the second-order EcoWellness model, including all seven of the originally defined lower-level factors. This decision was based both on a priori EcoWellness theory and the factor analysis process. This section includes each of the seven scales' factor loadings and relationships to the higher order factor of EcoWellness. Tables 19-25 include the unstandardized and standardized factor loadings and the standard errors for each item onto its respective factor. No absolute "rule of thumbs" currently exists in the interpretation of standardized or unstandardized loadings. Kline (2011) suggested that standardized factor loadings should typically be high, and stated .70 as an arbitrary example. Costello and Osborne (2005) recommended that an item should correlate with its factor at a minimum .32. After consultation with a member of his dissertation committee, the researcher elected to use a cutoff of .25 for standardized factor loadings

onto their respective factors, given that this is the first of presumably many studies exploring the factor structure of the REI. All items loaded onto their respective factors at or above the .25 standardized factor-loading criteria. Each of the seven subscales correlated with a higher order factor of EcoWellness at or above .60, with the Preservation scale loading the lowest at .61 and the highest subscale loading onto EcoWellness at .97.

Physical access. The subscale of Physical Access, which is the extent to which persons described themselves as being able to be in or with what they consider as nature, loaded onto EcoWellness with a Pearson's *r* correlation of .86. Standardized factor loadings for Physical Access ranged between .63 and .85, suggesting a strong factor. The unstandardized factor loadings, standard errors, and standardized factor loadings are reported in Table 19.

Table 19

Unstandardized Factor Loadings (Standard Errors) and Standardized Factor Loadings for the Physical Access Subscale (*n* = 6 Items)

Item Code	Unstandardized	Standardized
A_{PAi03}	1.00 (--)	.63
A_{PAi08}	1.45 (.08)	.87
A_{PAi09}	1.59 (.09)	.75
A_{PAi18}	1.13 (.09)	.56
A_{PAi19}	1.79 (.10)	.85
A_{PAi20}	1.44 (.08)	.80

Note. Dashes (--) indicate that the standard error was not estimated.

Sensory access. The subscale of Sensory Access, which is the extent to which persons reported experiencing nature either directly or indirectly their senses, loaded onto EcoWellness with a Pearson's *r* correlation of .92. Standardized factor loadings for Sensory Access ranged between .46 and .89, indicating a relatively strong factor. The unstandardized factor loadings, standard errors, and standardized factor loadings are reported in Table 20.

Table 20

Unstandardized Factor Loadings (Standard Errors) and Standardized Factor Loadings for the Sensory Access Subscale (*n* = 16 Items)

Item Code	Unstandardized	Standardized
A_{SAi02}	1.00 (--)	.65
A_{SAi06}	1.02 (.04)	.74
A_{SAii01}	1.03 (.06)	.60
A_{SAii07}	1.65 (.08)	.76
A_{SAii09}	1.35 (.07)	.78
A_{SAii10}	1.09 (.05)	.77
$A_{SAiii02}$	.74 (.05)	.49
$A_{SAiii07}$	.85 (.05)	.57
$A_{SAiii08}$	1.15 (.05)	.77
$A_{SAiii10}$	.94 (.04)	.76
$A_{SAiii11}$	1.40 (.10)	.46
$A_{SAiii13}$	1.59 (.08)	.73
A_{SAiv02}	.65 (.04)	.57
A_{SAiv08}	1.35 (.06)	.88
A_{SAiv09}	1.04 (.04)	.89
A_{SAiv10}	1.50 (.07)	.82

Note. Dashes (--) indicate that the standard error was not estimated.

***Connection*.** The subscale of Connection, which is the extent to which persons indicated a level of affective and cognitive closeness with nature, loaded onto EcoWellness with a Pearson's *r* correlation of .97. Standardized factor loadings for Protection ranged between .63 and .89, indicating a relatively strong factor. Among all of the scales, Connection appears to be the strongest and most closely associated with EcoWellness. A closer examination and discussion of Connection and its relationship to EcoWellness is provided in Chapter V. The unstandardized factor loadings, standard errors, and standardized factor loadings are reported in Table 21.

Table 21

Unstandardized Factor Loadings (Standard Errors) and Standardized Factor Loadings for the Connection Subscale (*n* = 11 Items)

Item Code	Unstandardized	Standardized
EI_{Ci02}	1.00 (--)	.81
EI_{Ci04}	.68 (.02)	.82
EI_{Ci05}	.43 (.02)	.72
EI_{Ci06}	.52 (.02)	.78
EI_{Cii01}	.66 (.02)	.88
EI_{Cii04}	.73 (.02)	.84
EI_{Cii07}	.64 (.02)	.89
EI_{Cii01}	.73 (.03)	.78
EI_{Ciii04}	.59 (.03)	.63
EI_{Ciii06}	.56 (.02)	.69
EI_{Civ04}	.63 (.02)	.75

Note. Dashes (--) indicate that the standard error was not estimated.

***Protection*.** The subscale of Protection, which is the extent to which persons included nature in their lifestyles for security and nourishment, loaded onto EcoWellness with a Pearson's *r* correlation of .77. Standardized factor loadings for Protection ranged between .36 and .69, indicating a weaker (relative to other subscales) association with the second-order factor of EcoWellness. As noted previously, item EI_{Ptii11} was deleted following initial item analyses and therefore was not included in the CFA. The unstandardized factor loadings, standard errors, and standardized factor loadings are reported in Table 22.

Table 22

Unstandardized Factor Loadings (Standard Errors) and Standardized Factor Loadings for the Protection Subscale (*n* = 8 Items)

Item Code	Unstandardized	Standardized
EI_{Pti01}	1.00 (--)	.56
EI_{Pti03}	.98 (.07)	.62
EI_{Pti10}	.47 (.06)	.36
EI_{Pti11}	1.05 (.13)	.36
EI_{Ptii01}	1.12 (.09)	.56
EI_{Ptii10}	1.34 (.10)	.64
EI_{Ptii02}	1.03 (.08)	.58
EI_{Ptii05}	1.34 (.10)	.69
EI_{Ptii11}	—[a]	—[a]

Note. Dashes (--) indicate that the standard error was not estimated.
[a] Item EI_{Ptii11} was dropped during the preliminary item analyses and not included in the CFA.

***Preservation*.** The subscale of Preservation, which is the extent to which persons claimed having and acting upon an environmental cause, loaded onto EcoWellness with a Pearson's *r* correlation of .61. Standardized factor loadings for Preservation ranged between .31 and .95, suggesting that the association between EcoWellness and Preservation is somewhat weaker when compared with other subscales, yet still strong. The unstandardized factor loadings, standard errors, and standardized factor loadings are reported in Table 23.

Table 23

Unstandardized Factor Loadings (Standard Errors) and Standardized Factor Loadings for the Preservation Subscale (*n* = 6 Items)

Item Code	Unstandardized	Standardized
EI_{Pv01}	1.00 (--)	.88
EI_{Pv03}	1.09 (.03)	.95
EI_{Pv04}	.62 (.03)	.70
EI_{Pv05}	.48 (.04)	.44
EI_{Pv06}	.72 (.04)	.65
EI_{Pv09}	.22 (.03)	.31

Note. Dashes (--) indicate that the standard error was not estimated.

***Spirituality*.** The subscale of Spirituality, which is the extent to which participants reported their experience of oneness with a higher power or life guiding force in nature, loaded onto EcoWellness with a Pearson's *r* correlation of .85. Standardized factor loadings for Protection ranged between .73 and .86, indicating a relatively strong factor.

The unstandardized factor loadings, standard errors, and standardized factor loadings are reported in Table 24.

Table 24

Unstandardized Factor Loadings (Standard Errors) and Standardized Factor Loadings for the Spirituality Subscale (n = 8 Items)

Item Code	Unstandardized	Standardized
T_{Si04}	1.00 (--)	.80
T_{Si05}	.64 (.02)	.81
T_{Sii01}	1.00 (.03)	.83
T_{Sii06}	1.04 (.03)	.86
T_{Sii07}	.77 (03)	.76
T_{Sii12}	.92 (.03)	.81
T_{Siii02}	.78 (.03)	.73
T_{Siii10}	.80 (.03)	.79

Note. Dashes (--) indicates that the standard error was not estimated.

Community connectedness. The subscale of Community Connectedness, which is the extent to which participants stated their experience of community with other persons while in or with nature, loaded onto EcoWellness with a Pearson's *r* correlation of .77. Standardized factor loadings for Protection ranged between .69 and .89, indicating a relatively strong factor. The unstandardized factor loadings, standard errors, and standardized factor loadings are reported in Table 25.

Table 25

Unstandardized Factor Loadings (Standard Errors) and Standardized Factor Loadings for the Community Connectedness Subscale (n = 6 Items)

Item Code	Unstandardized	Standardized
T_{CCi01}	1.00 (--)	.79
T_{CCi03}	1.03 (.03)	.81
T_{CCi04}	1.08 (.04)	.78
T_{CCi05}	.83 (.03)	.83
T_{CCii02}	1.03 (.03)	.89
T_{CCii08}	.97 (.04)	.69

Note. Dashes (--) indicate that the standard error was not estimated.

Scale scores. Although not an explicit research question, scale and subscale scores were calculated for the REI in preparation for testing the additional hypotheses. Scores were calculated by using a linear transformation (as described in Chapter III). The average scale and subscale scores were calculated, followed by the multiplication of each scale/subscale by a constant of 25. The possible range of scale and subscale scores was 25 to 100. Higher scores indicated greater aspects of EcoWellness. A total of eight scale/subscale scores were calculated for each participant: EcoWellness (across scales), Physical Access, Sensory Access, Connection, Protection, Preservation, Spirituality, and Community Connectedness. The mean scale and subscale scores were all greater than 70, possibly suggesting that the sample was more EcoWell than not. However, it is too early in the development of the REI to conclude what a “high” or “low” score of EcoWellness is. It is possible that alternative factor structures will emerge with further factor analytic

testing and the use of this instrument with other populations. Thus, caution should be employed when interpreting these scale and subscale scores. The descriptive statistics for the REI and its subscales are reported in Table 26.

Table 26

Descriptive Statistics for the Scale and Subscale Scores for the 61-item REI (*N* = 853)

Scale/Subscales	*M*	*SD*	Possible Range	Observed Range
Overall EcoWellness	80.6	11.0	25-100	31.2-100
Physical Access	87.0	12.4	25-100	25.0-100
Sensory Access	82.5	13.0	25-100	26.6-100
Connection	81.4	14.1	25-100	29.6-100
Protection	75.4	11.7	25-100	31.3-100
Preservation	79.6	13.0	25-100	29.2-100
Spirituality	81.5	14.8	25-100	25.0-100
Community Connectedness	74.3	15.6	25-100	25.0-100

Hypothesis 2 summary. The researcher originally hypothesized that a general third-order factor of EcoWellness would describe the associations among the lower order factors. Since a third-order factor structure did not emerge in assessing Hypothesis 1, Research Question 2 was modified and the researcher explored the model fit of four different first and second-order factor structures of EcoWellness. Based on the analyses in assessing Hypothesis 1, the researcher concluded that a second-order factor structure, including a higher-order factor of EcoWellness and the original seven lower-level factors, would possess model fit that was not appreciably worse than a lower-level model

including only the seven subscales. The modified Hypothesis 2 was supported, suggesting that a second-order factor with the seven originally posited first-order factors possessed acceptable model fit. The model fit of a second-order model was similar to and did not possess model fit that was appreciably worse than a lower-level factor model. Despite good indices of model fit and strong factor loadings, the strong correlations between the seven subscales are noteworthy and may have several implications in assessing discriminant validity. The extent of relationship between EcoWellness and its subscales are addressed in Hypothesis 4.

Hypothesis 3

The researcher hypothesized that the REI and its subscales would possess high reliability, as evidenced by obtained Cronbach's alphas (i.e., internal consistency reliability) of at least .80 on each of the REI's empirically determined scale and subscales. This hypothesis was supported. Reliability analyses were conducted for EcoWellness and each of the REI's seven subscales. The internal consistency reliabilities were calculated as follows: EcoWellness, .95, Sensory Access, .91, Physical Access, .81, Protection, .71, Preservation, .79, Spirituality, .90, and Community Connectedness, .88 (also reported on the diagonal in Table 26). Despite the lower internal consistency reliabilities for Protection and Preservation, scholars have typically described reliabilities between .70 and .80 as adequate and anything over .80 as very good or excellent (Kline, 2011).

Hypothesis 4

As a way to demonstrate discriminant validity, the researcher hypothesized that the subscales of the REI would share disattenuated correlations at or below .850. The model-based correlations resulting from a CFA represent disattenuated correlations. Thus, the calculation of disattenuated correlations was not necessary as performed in the pilot study. The lower-order factors Sensory Access and Connection were correlated at .89, suggesting poor discriminant validity between these two scales (see Table 27).

Table 27

Internal Consistency Coefficients and Model-Based Correlations (i.e., Disattenuated Correlations) between EcoWellness and its Seven Subscales

Factor	PA	SA	C	Pt	Pv	S	CC	EW
PA	.81							
SA	.79	.90						
C	.83	.89*	.91					
Pt	.66	.71	.74	.71				
Pv	.53	.56	.59	.47	.79			
S	.73	.79	.83	.66	.52	.90		
CC	.67	.71	.75	.60	.47	.66	.88	
EW	.86*	.92*	.97*	.77	.61	.85*	.77	.96

Note. Cronbach's alphas appear on the diagonal and disattenuated correlations are listed below the diagonal.
* Indicates a disattenuated correlation of .85 or greater.

Connection was also highly correlated with Physical Access and spirituality with correlations approaching .850, suggesting that these constructs were assessing similar

constructs. The subscales of Physical Access, Sensory Access, Connection, and Spirituality all possessed disattenuated correlations of above .850 with Overall EcoWellness. Thus, although several subscales of the REI appear to be distinct, it cannot be concluded that the measure possesses complete discriminant validity. Several of the scales appear to be assessing the same construct. The relationships between scales and the implications for the development and use of the REI and EcoWellness theory will be discussed at length in Chapter V.

Hypothesis 5

The researcher hypothesized that the REI and its subscales would account for a significant proportion of variance in overall wellness (operationalized as the Total Wellness score of the 5F-Well). A total of 792 participants were included in the analyses, given that only that proportion of the sample completed both the REI and the 5F-Wel. This hypothesis was supported, but on account of multicollinearity, two separate regression analyses were run. First, a multiple regression analysis including Overall EcoWellness and the seven subscales was run. SPSS excluded Overall EcoWellness on account of multicollinearity, and a separate follow-up linear regression analysis was run with only Total EcoWellness predicting Total Wellness.

Multiple regression. The *F*-test indicated a statistically significant multiple regression model $F = 22.891$ ($df = 7$, $p < .05$). The *Adjusted* R^2 suggested that the predictor variables accounted for approximately 17% of the variance in Total Wellness scores. Upon closer examination, the Physical Access (t (791) = 2.180, $p = .03$), Spirituality (t (791) = 1.995, $p = .046$), and the Community Connectedness (t (791) =

2.215, $p = .027$) subscales were the only statistically significant independent variables in predicting Total Wellness. Indices of multicollinearity were well below the rule of thumb indices (a tolerance of less than .20 and a VIF of greater than five suggests multicollinearity; O'Brien, 2007), but the high correlations between several of the subscales and Overall EcoWellness scale may suggest otherwise. The multiple regression results are reported in Table 28.

Table 28

Multiple Regression Predicting Total Wellness from Seven REI Subscales ($N = 792$)

Variable	*B*	*S.E.*	*β*	*t*	sig.	95% CI for *B*	Tolerance	VFI
Constant	52.08	2.24	—	23.21	.000	47.68; 56.49	—	—
Physical Access	.07	.03	.11*	2.2	.030	.007; .137	.435	2.30
Sensory Access	.06	.04	.09	1.5	.129	-.016; .129	.310	3.23
Connection	-.03	.04	-.05	-.86	.391	-.103; .040	.266	3.76
Protection	.05	.03	.07	1.4	.166	-.019; .113	.445	2.25
Preservation	.05	.03	.09	1.9	.058	-.002; .111	.508	1.97
Spirituality	.06	.03	.11*	2.0	.046	.001; .125	.326	3.06
Community Connectedness	.06	.03	.11*	2.2	.027	.007; .113	.396	2.52

*$p < .05$

Linear regression results. The *F*-test indicated a statistically significant linear regression model $F = 150.804$ ($df = 1$, $p < .05$). The *Adjusted* R^2 suggested that the predictor variable, Overall EcoWellness, accounted for approximately 16% of the variance in Total Wellness scores, which was similar to the proportion accounted for by

the seven subscales in the multiple regression just reported. Overall EcoWellness (*t* (791) = 12.280, *p* = .00) was statistically significant in predicting Total Wellness. Essentially, for every unit increase of Overall EcoWellness, approximately a .297 gain in Total Wellness would be expected. Hypothesis 5 is supported, as indicated by the multiple and linear regression results. Table 29 reports the linear regression results.

Table 29

Linear Regression Predicting Total Wellness from Overall EcoWellness (*N* = 792)

Variable	B	S. E.	β	t	sig.	95% CI for B	Tolerance	VFI
Constant	53.98	1.98	—	27.29	.000	50.093; 57.857	—	—
Overall EcoWellness	.297	.02	.40*	12.28	.000	.250; .345	1.00	1.00

*$p < .05$

Hypothesis 6

The researcher hypothesized that the REI and its subscales would not be susceptible to socially desirable responding, as assessed through Strahan and Gerbasi's (1972) M-C 1(10). In examining this hypothesis, the researcher first calculated the internal consistency of the M-C 1(10). The researcher used the Cronbach's alpha procedure in SPSS as this coefficient is mathematically equivalent to the Kuder Richardon-20 (KR-20) coefficient, which is used to calculate the internal consistency reliability for dichotomous scales. The internal consistency was calculated as .65, suggesting that participants answered items in an inconsistent fashion. Thus, the results utilizing the M-C 1(10) in this study should be interpreted with caution.

Since “True” was coded as “1” and “False” was coded as “2” on the ten-item scale, the maximum possible score of the M-C 1(10) was 20 and the minimum score was 10. The range of total scores on the M-C 1(10) was 10-20. The mean total M-C 1(10) score was 14.7 (*SD* = 2.15), which may suggest that on the whole participants answered the M-C 1(10) in a socially desirable manner.

Following the calculation of the reliability coefficient for the MC-10 scale, the scale scores of the REI and its seven subscales were correlated with the sum scores of the MC-10. These correlations are reported in Table 30.

Table 30

Correlations between the M-C 1(10), the REI Scale and Subscales, and Total Wellness (TW)

Scale/Subscale	M-C 1(10)
EW	.09*
PA	.04
SA	.08*
C	.04
Pt	.17*
Pv	.18*
S	.02
CC	-.004
TW	.22*

*$p < .05$

Several relationships between the M-C 1(10) and the REI and its subscales were statistically significant ($p < .05$). The M-C 1(10) was significantly correlated with EcoWellness ($r = .09$), Sensory Awareness ($r = .08$), Protection ($r = .17$), and Preservation ($r = .18$). Interestingly, the M-C 1(10) was also significantly correlated with the Total Wellness scores of participants ($r = .22$). Caution should be employed when interpreting these results given the low obtained internal consistency of the scale. The interpretation of these results will be further discussed in Chapter V.

Hypothesis 7

The researcher not did explicitly state a hypothesis in regard to the exploratory research question of whether certain demographic factors would predict a significant proportion of variance in the REI and its subscales. The researcher ran a series of eight multiple regressions in assessing this hypothesis. He used a Bonferonni correction when assessing the statistical significance of each multiple regression analysis. Eight total additional multiple regression coefficients were obtained. Where statistical significance was normally indicated when a value of $p < .05$ was obtained for the purposes of this study, a Bonferonni correction of $p = (.05/8)$ accounted for the additional regressions run in assessing Hypothesis 7. Such a correction included a critical p-value of .00625.

The demographic factors included in these supplementary analyses consisted of mostly transformed dichotomous demographic questions taken from the 5F-Wel. They included college status (college graduate or not), terminal degree status (yes/no), Caucasian status (yes/no), sexuality (heterosexual or not), marital status (yes/no) full-time employment (yes/no), biological sex, and other questions related to EcoWellness, which

have already been reported (i.e., current perceived level of EcoWellness, importance of EcoWellness, and hours spent with nature). Since many of these demographics were modified (i.e., turned into dichotomous variables), the dichotomous demographic variables are reported in Table 31.

Table 31

Dichotomous Demographic Variables Included in Regression Analyses

Variable	*n*	%
Female	658	77.1
Current Student	216	25.3
College Graduate	608	71.3
Terminal Degree Obtained	92	10.8
Caucasian	696	81.6
Heterosexual	713	83.6
Married	436	51.1
Employed Full Time	492	57.7

The multiple regression analyses suggested that several demographic factors did, in fact, significantly predict different aspects of EcoWellness. Each of the eight *F* tests for each of the multiple regressions was statistically significant ($p < .00625$) and the proportion of variance accounted for by each of the eight multiple regression models ranged between 24.7% and 55.4%. Since many of the eight models were nearly identical in terms of which demographic factors were statistically significant in predicting aspects

of EcoWellness, only the multiple regression model of Overall EcoWellness as the dependent variable is reported.

Overall EcoWellness. The *F*-test indicated a statistically significant multiple regression model $F = 67.944$ ($df = 7$, $p < .00625$). The *Adjusted* R^2 suggested that the predictor variables accounted for approximately 55.4% of the variance in Overall EcoWellness scores. Upon closer examination, Caucasian status (t (594) = -2.927, p = .004), perceived level of EcoWellness (t (594) = 6.862, p = .000), importance of EcoWellness (t (594) = 14.778, p = .000), and number of hours spent with nature (t (594) = 3.778, p = .004), positively predicted Overall EcoWellness. Generally speaking and across the eight regression analyses, persons who identified as Caucasian, those who spent greater amounts of time in nature, those who reported having high perceived EcoWellness, and persons who found EcoWellness to be important experienced higher EcoWellness scores overall. Indices of multicollinearity were mixed (O'Brien, 2007), suggesting that some multicollinearity existed within the data. Thus, once again, these data should be interpreted with caution. Multiple regression statistics for Overall EcoWellness are reported in Table 32.

Table 32

Multiple Regression Predicting Overall EcoWellness from Demographic Factors (N = 595)

Variable	B	S. E.	β	t	sig.	95% CI for B	Tolerance	VFI
Constant	53.580	2.139	—	25.046	.000	49.38; 57.78	—	—
College Graduate	-.589	.806	-.021	-.731	.465	-2.172; .994	.906	1.10

Terminal Degree	-1.031	.922	-.032	-1.119	.264	-2.841; .779	.936	1.07
Caucasian Status	-2.952	1.008	-.082*	-2.927	.004	-4.932; -.971	.964	1.04
Heterosexual Status	-.528	1.062	-.014	-.497	.620	-2.614; 1.559	.961	1.04
Marital Status	-.713	.639	-.031	-1.116	.265	-1.969; .542	.948	1.06
Student Status	.707	.719	.028	.984	.326	-.704; 2.119	.932	1.07
Employment Status	1.019	.676	.043	1.509	.132	-.307; 2.346	.906	1.10
Perceived EcoWellness	1.517	.221	.248*	6.862	.000	1.083; 1.951	.576	1.74
Importance of EcoWellness	2.707	.183	.534*	14.778	.000	2.347; 3.066	.577	1.74
Hours with Nature	.084	.022	.107*	3.778	.000	.040; .128	.932	1.07
Biological Sex	-1.377	.851	-.046	-1.618	.106	-3.050; .295	.919	1.09

*$p < .00625$

Summary of the Results

The purpose of Chapter IV was to examine the seven research questions and associated hypotheses, which were discussed in Chapters I and III. In the first research question, the researcher hypothesized that an EcoWellness model with three second-order factors (i.e., access, environmental identity, and transcendence) and the corresponding seven first-order factors would exhibit adequate model fit. A lower-level factor model was tested and it was found to possess adequate model fit, but a higher third-order factor structure could not be tested on account of high correlations between the lower-level factors. Thus, an EFA was conducted to determine whether a higher second-order factor

of EcoWellness would emerge. A higher-order factor of EcoWellness did account for much of the variance between the lower-level factors, lending partial support to Hypothesis 1, which set the researcher up to assess Hypothesis 2.

Following the testing of Hypothesis 1, the second hypothesis required modification. Since a third-order factor structure did not emerge in assessing Hypothesis 1, the researcher believed that a second-order factor structure that included a higher-order factor of EcoWellness and the seven lower-level factors would possess model fit that was not appreciably worse than a lower-level model including the seven factors. The researcher tested four different factor structures, two of which were exploratory. A second-order factor structure possessing adequate model fit was accepted for further testing. Although this model partially supported Hypothesis 2, it is noteworthy that the correlations between several of the seven subscales and the higher order factor of EcoWellness were high.

In Hypothesis 3, the researcher asserted that the REI and its subscales would possess high reliability, as evidenced by obtained Cronbach's alphas (i.e., internal consistency reliability) of at least .80 on each of the REI's empirically determined scale and subscales. Each of the seven subscales and scale of EcoWellness possessed internal consistency reliabilities that were considered adequate to excellent, thus supporting Hypothesis 3. In assessing Hypothesis 4, the researcher found that several of the subscales possessed disattenuated correlations of .850 or higher, suggesting a lack of full discriminant of the REI as it stands. Such a result will be discussed and explored further in Chapter V.

Furthermore, the researcher predicted (Hypothesis 5) that the REI and its subscales would account for a significant proportion of variance in overall wellness (operationalized as the Total Wellness score of the 5F-Wel). This research question was supported, with several of the subscales (i.e., Physical Access, Spirituality, and Community Connectedness) accounting for significant proportions of variance in Total Wellness.

In Hypothesis 6, the researcher predicted that the REI and its subscales would not be susceptible to socially desirable responding, as assessed through Strahan and Gerbasi's (1972) M-C 1(10). Several of the subscales were correlated with the M-C 1(10), suggesting that social desirability may have played a role in how respondents answered the REI. Caution should be taken in the interpretation of these relationships given the low reliability of the instrument.

Finally, in Hypothesis 7, the researcher explored whether certain demographic factors would predict a significant proportion of variance in the REI and its subscales. The researcher ran a series of multiple regressions in assessing this hypothesis and found that time spent with nature, one's identification with the construct of EcoWellness in their own lives, and one's ethnicity may play a role in predicting different aspects of EcoWellness. The concluding chapter includes a discussion of the study results in light of the relevant theoretical and empirical literature. Study interpretations, limitations, and implications for counselor education, counseling practice, and future research are examined.

CHAPTER V

DISCUSSION

The empirical multidisciplinary literature has demonstrated that nature impacts many aspects of human wellness in both clinical and non-clinical settings (Reese & Myers, 2012). Despite the therapeutic effects of nature and its current assimilation into many therapeutic paradigms (Buzzell & Chalquist, 2009), the professional counseling empirical literature where nature is integrated into practice is scant, and wellness models and associated measures based in counseling do not overtly include nature. Reese and Myers proposed EcoWellness as the missing link in the multidisciplinary wellness models in counseling, and recommended that an assessment be developed to further explore nature and wellness in counseling. To date, no published instrument of EcoWellness or any other measure posited to assess one's connection with nature relative to correlates of wellness has been developed. The purpose of this study was to develop a quantitative measure of EcoWellness (i.e., the REI) and to assess its initial validity and reliability. A priori assumptions about EcoWellness based in nature research and theory guided the development and empirical evaluation of the instrument, which was administered to 1,136 research participants.

The researcher developed seven research questions in exploring the validity and reliability of the REI. He reported the results of the hypothesis testing in Chapter IV. Chapter V includes the delineation and explanation of the results, first contextualized in

the study sample and instruments utilized in exploring the study hypotheses. Overall, many of the hypotheses tested in this study have gained partial or full support. An alternative factor structure of the REI has emerged, suggesting an alternative model of EcoWellness than was originally proposed. Several interesting relationships between the REI and other instruments have also emerged. In this chapter, the results of each hypothesis are discussed and a summary of the major findings is provided, including a modified EcoWellness model and a description of its relationships to holistic wellness. The study limitations are examined and a big-picture view of the study results is scrutinized in terms of their theoretical, empirical, clinical, and pedagogical implications.

Study Overview

A sample of 1,136 potential research participants recruited through researchmatch.org was utilized for this study. In addition, a variety of assessments were used in assessing the initial validity and reliability of the REI. Both facets impacted the study findings. The influences of these variables on the study outcomes are explored.

Participants

The researcher directly recruited a total of 1,136 potential participants from Researchmatch.org for the purposes of this study. At least ten participants completed the study twice, which was discovered when the researcher went to randomly select winners for the six $50 gift cards. On account of not knowing which participants completed which particular assessment, the researcher was unable to eliminate redundant assessment information or determine further whether additional respondents had completed the study

more than once. This finding and its potential implications for the validity of the study will be discussed further in the Limitations section.

The typical respondent in this study was female, Caucasian, heterosexual, in her 20's or 30's, highly educated, working full-time, and possessing a perceived strong sense of EcoWellness. Such a sample may have well represented the Researchmatch.org population, but the generalization of this study's findings to other populations (e.g., males, ethnic minorities, persons with less education, etc.) is limited. Thus, the findings of this study should be interpreted with caution and further research is needed in exploring the constructs included in this study with different populations.

Instruments

The researcher included the REI, the 5F-Wel, and the M-C 1(10) in exploring the seven research questions. The specific relationships between these scales will be examined in the context of the study hypotheses. The potential contributions unique to each instrument on the study findings are discussed.

REI. The initial item analyses of the 62-item REI suggested a strong and consistent measure of EcoWellness. All but one item (EI_{Ptii11}; "Some things in nature are beyond my understanding") possessed a corrected item-total correlation above .25 with the entire REI and all of the items possessing item characteristics (i.e., standard deviations, skewness, and kurtosis) at or above the cutoff values presented by the researcher in Chapter IV. It is plausible that item EI_{Ptii11} may have had multiple meanings to different participants as it was answered in many different, inconsistent ways. Thus,

item EI_{Ptii11} was removed following the initial item analyses resulting in a 61-item REI that was evaluated in the hypothesis testing.

The REI possessed strong to acceptable internal consistency reliabilities (i.e., ranging from .71 to .96). The mean scores across the REI scale and subscales were closer to the maximum score of 100 than the minimum score of 25, suggesting an "EcoWell" sample overall. Several subscales of the REI also possessed a high degree of overlap with one another (i.e., high correlations between factors), indicating that some of the nature constructs assessed with this particular sample may be more closely related than originally hypothesized. Such a finding will be discussed with further detail in a later section.

Furthermore, as already discussed, most respondents in the sample considered EcoWellness as an important part of their lives; thus, it is not surprising that the average REI scale and subscale scores were all above 70, suggesting that most participants considered themselves high on different aspects of EcoWellness. The highest average subscale score, Physical Access, was 87.0 out of 100. Across previous research studies, people who are able to access nature at their own discretion display healthier traits (Reese & Myers, 2012). For example, nature exposure has been linked with lower levels of aggression and violence in adult populations (Kuo & Sullivan, 2001a, 2001b), increased self-control and decreased stress in children (Faber Taylor et al., 2002), and increased attention capacity in children (Wells, 2000). It is possible that persons with lower Physical Access scores might score lower on other aspects of EcoWellness. More research is needed with additional populations. For example, a study including persons

with lower physical access to nature could determine whether high scores across the subscales remain an artifact of this sample or whether items are worded in ways that, regardless of trait, persons would score high on different aspects of EcoWellness.

5F-Wel. The Total Wellness scale possessed high reliability. Though not explicitly included in any of the research questions, each of the second-order scales also possessed acceptable internal consistency reliabilities. The mean Total Wellness score (78.04) was well above the published norm (71.63; Myers & Sweeney, 2005b) for the 5F-Wel, suggesting that this sample included a group of participants that are more well than the average person in the general population in the United States. Such a finding is consistent with and may be representative of the demographic characteristics of participants in this study. It may also be possible that respondents were answering the 5F-Wel in a socially desirable way given that the 5F-Wel was significantly correlated with the M-C 1(10). Such a finding was inconsistent with the findings of H. L. Smith, Robinson, and Young (2007), in which these authors did not identify a significant relationship between wellness and social desirability using these same measures. The relationships between the M-C 1(10) and the other scales will be further discussed in a later section.

M-C 1(10). The internal consistency reliability (i.e., K-R 20) for the M-C 1(10) was .65, suggesting less than satisfactory reliability. Such low reliability falls within the reliability range originally reported by Strahan and Gerbasi (1972) for the M-C 1(10), which included K-R 20 reliabilities between .59 and .70 across studies. The calculated reliability for this study is inconsistent and lower than Fischer and Fick's (1993) reported

internal consistency reliability of .876 for the M-C 1(10). The lower reliability found in this study suggests an unstable social desirability construct. In addition, an absolute cut-off score has not been published for the M-C 1(10); no values have been reported indicating what values suggest higher or lower social desirability. Without complete certainty, participants may have filled out the instrument in a socially desirable manner, given that the total mean score of the M-C 1(10) was 14.7 (out of 20) and that the measure correlated significantly with several others. Thus, the results of the hypothesis testing including this instrument have been interpreted with caution.

Discussion of Results

The researcher developed seven research questions and associated hypotheses in exploring the initial validity and reliability of the REI. These results were reported in Chapter IV. This section includes a discussion of the study findings broken down by each hypothesis. The discussion of Hypotheses 1 and 2 are combined given that both relate to determining the factor structure of the REI.

Hypotheses 1 and 2

Reese and Myers (2012) developed a model of EcoWellness in which they proposed three primary constructs. The proposed model included access, environmental identity, and transcendence (with transcendence broken down further into the constructs of spirituality and community connectedness). Upon closer inspection of the theoretical and multidisciplinary empirical literature, the researcher expanded these proposed constructs in Chapter II. The proposed model included the original three proposed scales as second-order factors, the seven corresponding lower-level or first-order factors, and a

third or higher order factor of EcoWellness. The researcher developed the REI with the intent of assessing this third-order factor structure in this study.

The first hypothesis included the assertion that an EcoWellness model with three second-order factors (i.e., access, environmental identity, and transcendence) and the corresponding seven first-order factors would exhibit adequate model fit. In order to test this model, the researcher planned to first run a CFA assessing a seven lower-level factor model followed by a CFA that tested a third-order factor structure. A lower-level model (with seven factors) possessed good model fit, although the lower-level model also possessed a high degree of overlap between factors (high correlations). When the researcher went to run the third-order CFA, the statistical package LISREL was unable to run the analysis on account of these high correlations. Thus, the researcher ran an EFA utilizing the correlation matrix between the lower-level factors. A single factor of EcoWellness accounted for much of the variance between the seven lower-level factors. Therefore, Hypothesis 1 received partial support in that a higher order factor emerged from the data.

Since a third-order factor structure did not emerge in assessing Hypothesis 1, Research Question 2 was modified to test a second-order factor structure. A second-order model including the higher order factor of EcoWellness possessed model fit that was not appreciably worse than the first-order model. The standardized factor loadings for all of the factors were well within the acceptable ranges and skew and kurtosis were minimal. Thus, the modified Hypothesis 2 was supported, suggesting that a second-order factor with the seven originally posited first-order factors possessed acceptable model fit.

The findings of Hypotheses 1 and 2 are inconsistent with the three-construct model proposed by Reese and Myers (2012) and the second EcoWellness model that was further described and articulated in Chapter II. Several explanations may serve to support the study findings. First, the factor structure emerging from this particular study may remain an artifact of the sample utilized in exploring the study constructs. As discussed, the sample used in this study was predominantly female, Caucasian, heterosexual, and highly educated. It seems plausible that respondents presenting with characteristics different than those found in this research sample might complete the instrument in a different way, resulting in an alternative factor structure. Thus, more research is needed with the REI including additional populations more representative of national distributions of demographic characteristics (i.e., age, gender, and ethnicity) to further confirm the factor structure of the REI.

Second, given the high correlations found between several of the first-order scales when assessing Hypothesis 4, it is possible that some of the items operationalizing the constructs may not be representative of the distinct constructs included in EcoWellness. Thus, an alternative item pool may need to be created in generating more distinct subscales of the REI. For example, the current questions of the REI assess thoughts, emotions, and behaviors. It may be interesting to create a second survey with the wants, needs, and values of persons related to EcoWellness. For example, item A_{PAi03} of the REI states “Nature surrounds me in my daily life.” It might also be important to have a supplementary question that states “I want nature to surround me in my daily life.” This

distinction is similar to two demographic questions included in this study. One question asked for an individual's current level of EcoWellness and the second question asked respondents about the importance of EcoWellness in their lives. On average, participants scored one point higher on the importance of EcoWellness than their current level of EcoWellness (on a scale of one to ten). Meaning, participants indicated that the perceived level of importance of EcoWellness was higher than its current status in their lives. Thus, it may be critical to capture both the level of importance and actual perceived aspects of EcoWellness in the assessment of EcoWellness.

Third, it is possible that a second-order model of EcoWellness may provide an accurate depiction of the associated constructs underlying the REI, refuting the models proposed by Reese and Myers (2012) and the model presented in Chapter II. However, the research in this study was exploratory, even though a priori assumptions were made about the constructs underlying EcoWellness. Such a priori assumptions were based in the previous nature research, much of which was descriptive, and nature theory, much of which has been criticized for lack of falsifiability (Joye & De Block, 2011). The mere fact that no research or theory can be cited to explain the alternative factor structure obtained in this study supports the exploratory nature of the study. Thus, more research is needed with the current REI instrument to determine whether the current study results can be replicated or whether new findings may emerge with additional populations tested.

Hypothesis 3

The researcher hypothesized that the REI and its subscales would possess high reliability, as evidenced by obtained Cronbach's alphas (i.e., internal consistency

reliability) of at least .80 on each of the REI's empirically determined scale and subscales. This hypothesis was supported as the observed Cronbach's Alphas were between .71 and .95, indicating adequate to excellent internal consistency for each scale. Preservation (.79) and Protection (.71) possessed the lowest internal consistency reliabilities suggesting that they may be the most unreliable constructs of EcoWellness. Both constructs were originally posited as representing as aspects of environmental identity. Protection is the extent to which an individual incorporates nature into her/his lifestyle to aid in one's existence and Preservation is the sense of commitment or self-agency the individual sees his or herself as having in supporting or sustaining other living systems. Other measures of environmental identity specifically related to environmental agency have also possessed lower internal consistency reliability (i.e., NR-Perspective, .65; Nisbet et al., 2009).

One explanation for the lower reliabilities is that the items assessing these constructs may be too specific, thus resulting in inconsistent responses on the scales. For example, Item EI_{Ptii01} states, "I remain calm when near animals that could harm me," may be answered substantively different than the item EI_{Ptii05}, which states, "There are aspects of nature that can protect me." These items, both of which are on the Protection scale, may be assessing aspects of Protection, but it seems possible that a person could believe very strongly that aspects of nature can protect them while also experiencing a lack of calmness when encountering a brown bear in Yellowstone. A modification of the items in these two different scales may be in order if future testing with a more diverse sample results in similar values in reliabilities. Such a modification may increase the internal

consistency reliabilities of these scales, though more research is needed with the current two scales to determine whether the scale reliabilities can be replicated as they stand.

Overall, the reliabilities of the REI and its subscales were adequate to excellent. Relative to other nature scales, the REI and its subscales possessed similar or superior internal consistency reliabilities. The Connectedness to Nature Scale (CNS) possessed a published reliability ranging between .82 and .84 (Mayer & Frantz, 2004). The Nature Relatedness scale possessed scale reliabilities ranging between .66 and .87 (Nisbet et al., 2009). The Nature Contact Questionnaire (NCQ) possessed a published internal consistency reliability of .64 and a test-retest reliability of .85 (Largo-Wight et al., 2011b). Although further testing with the REI needs to be conducted, the obtained initial internal consistency reliabilities for the instrument are promising.

Hypothesis 4

One of the more interesting findings of this study was associated with Research Question 4. The researcher hypothesized that the subscales of the REI would share disattenuated correlations at or below .850. Several of the subscales (i.e., Sensory Access, Physical Access, and Spirituality) were correlated with the Connection scale near or above .850, which may suggest that these scales may be assessing similar constructs. The entire REI scale also possessed disattenuated correlations with all four of these scales at or above. 850. Such findings have serious implications for discriminant validity (Jöreskog, 1971), which initially caused the researcher to believe that the scale may just be a one-factor EcoWellness scale. Thus, the researcher assumed that a one-factor model would possess model fit that was appreciably greater than any other model. This result

was not obtained, suggesting that a one-factor model was inadequate in explaining the data. This finding suggests that the REI is not a single factor scale, and more research is needed in exploring the factor structure of the instrument.

The obtained correlations between the Connection subscale and other subscales were found to be a theoretically interesting finding. For example, Connection was correlated the highest with Sensory Access, suggesting that both constructs were assessing the same trait. Connection was also highly correlated with Spirituality. Reese and Myers (2012) defined EcoWellness as "a sense of appreciation, respect for, and awe of nature that results in feelings of connectedness with the natural environment and the enhancement of holistic wellness" (p. 400). A central focus of EcoWellness is how the perceived connection experienced with nature results in the occurrence of holistic wellness. Thus, the researcher initially thought that a combination of scales would result in a decrease in the correlations between scales. However, when the researcher attempted combining scales (i.e., Connection and Sensory Access) when assessing the factor structure of the REI, the correlations between a newly formed scale (i.e., "Nature Identity") and other factors did not decrease and the model fit of this particular scale was appreciably worse than several of the other models. The Connection scale also possessed a disattenuated correlation of .97, suggesting that the eleven items of the Connection scale are representative of the entire REI.

Other measures of connectedness to nature have already been developed (Mayer & Frantz, 2004; Nisbet et al., 2009). As discussed in Chapter II, the Connectedness to Nature (CNS) construct was operationalized through a 14-item scale intended to assess

one's experiential and emotional connection with nature (Mayer & Frantz, 2004). The Nature Relatedness (NR) construct and an associated measure were developed to explore one's emotional, affective, and experiential connection with nature (Nisbet et al., 2009). In addition, EcoWellness has been posited to include one's physical and sensory access, level of emotional and cognitive connection, experience of environmental agency and knowledge about nature for one's protection, spirituality, and community connectedness. More research is needed to determine whether the constructs of Spirituality, Physical Access, and Sensory Access are merely extensions of Connection.

Overall, the results of Hypothesis 4 are perplexing given that one scale appears to be assessing the same characteristics of three others, especially since each scale has been posited to assess a distinct construct. The multidisciplinary research has indicated different aspects of how nature impacts wellness. For example, for an individual to experience any kind of wellness from nature they first need to have some level of access to it (Barton et al., 2012). Second, people tend to experience greater wellness in or with nature when they experience some level of connection to it (Korpela et al., 2009). Third, persons who tend to experience connection with others or with a higher power also tend to experience greater wellness as a consequence of their exposure to nature (Sweatman & Heintzman, 2004; Weinstein et al., 2009). A major limitation of the research is that much of it has been descriptive and only some of it has been experimental. Thus, it may be possible that outcomes related to spirituality, connection, and access are confounded with each other. Items on the different scales may need to be reevaluated for redundancy with items on other scales. Some items may need to be modified so as to become more distinct

from the other scales. Some subscales may even need to be deleted altogether if further research continues to suggest that they are assessing similar or identical dimensions. However, such changes should not be adopted without further testing of the instrument with a sample that is more inclusive of characteristics more representative of the general population.

Hypothesis 5

The researcher hypothesized that the REI and its subscales would account for a significant proportion of variance in overall wellness (operationalized as the Total Wellness score of the 5F-Wel). As reported in Chapter IV, two separate regression analyses were run on account of multicollinearity within the data. Model one utilized all seven of the subscales of the REI in predicting Total wellness. Model two included Overall EcoWellness as the sole predictor of Total Wellness. Both regression models accounted for approximately 16-17% of the variance within Total Wellness.

In Model 1, Physical Access, Spirituality, and Community Connectedness were statistically significant predictors of Total Wellness. Such results make both intuitive and empirical sense. First, in order to experience any wellness from nature, one must first have access to it. Across studies, nature exposure has demonstrated positive impacts on reducing aggression and violence in adults (Kuo & Sullivan, 2001a, 2001b), increasing self-control and decreasing stress in children (Faber Taylor et al., 2002), increasing attention capacity in children (Wells, 2000), reducing anxiety and depression, and fostering self-efficacy (Berget et al., 2011; Pederson et al., 2011). Second, the notion of Spirituality lies at the center of the Wheel of Wellness model (Witmer & Sweeney, 1992)

and is viewed as a vital component of the IS-Wel Model (Myers & Sweeney, 2005). Thus, being able to experience a sense of spirituality in nature may allow an individual to experience greater Total Wellness. Having a garden (Unruh & Hutchinson, 2011), going on vacation in or near nature (Ellard et al., 2009), or going to nature to experience a greater closeness to one's life-guiding principles or beliefs (Sweatman & Heintzman, 2004) have all been associated with greater wellness. Third, the experience of community with others in nature also impacts wellness. In particular, community gardens (Milligan, et al., 2004; Wakefield et al., 2007) or having the presence of nature (Weinstein et al., 2009) influences compassion and caring towards others. Nature brings people together and seems to enhance the nurturing of others. Thus, it makes empirical and practical sense that one should experience a sense of community with others in nature and that they might also experience greater wellness.

In isolation, each of the three variables possessed statistically significant yet marginal effects on Total Wellness. For each one-point increase in any of these subscales, .06-.07 increase in Total Wellness was predicted. Thus, the results of Model Two may help to further demonstrate the combined effects of these three and the other subscales on Total Wellness. For every one-point increase in Overall EcoWellness, a .30 increase in Total Wellness was predicted. For example, a score of 75 on the REI would predict a score of approximately 76 of Total Wellness. A score of 30 on the REI would predict a score of approximately a 63. The difference in the REI score accounts for a difference of nearly 16 points on Total Wellness. Therefore, Total EcoWellness appeared to be able to predict Total Wellness within the sample. The more EcoWell an individual was, the more

he or she was holistically well. Given the exploratory nature of this study, replication is necessary prior to using the REI as a way to predict Total Wellness.

Hypothesis 6

The researcher hypothesized that the REI and its subscales would not be susceptible to socially desirable responding, as assessed through the M-C 1(10) (Strahan & Gerbasi, 1972). Several of the REI subscales (i.e., Sensory Access, Protection, Preservation) and the REI scale were significantly correlated with the M-C 1(10). Such a result is in conflict with the researcher's hypothesis. However, it was noted that the magnitudes of the correlations were somewhat weak (Kline, 2011; i.e., .09, .08, .17, and .18). With a smaller sample size, these correlations may not have been statistically significant. For example, Mayer and Frantz (2004) correlated their measure of the CNS with the long measure of the Marlowe-Crown Social Desirability Scale. With a sample of 65, the researchers obtained a correlation of .17 between the CNS and the MC and found it to be non-significant ($p > .05$). Therefore, the statistical significance of these relationships should be interpreted with caution. Interestingly, Total Wellness (as assessed via the total score on the 5F-Wel) was significantly correlated the highest (.22) with the M-C 1(10). H. L. Smith et al. (2007) also explored the validity of the 5F-Wel by utilizing the long form of the M-C 1(10). These scholars did not find statistically significant relationships between the 5F-Wel and the measure of social desirability, although they also utilized a smaller sample size in exploring these and other constructs.

It is noteworthy that the different subscales of the REI and Total Wellness correlated significantly with the M-C 1(10). As mentioned, the magnitudes of the

correlations were small and statistical significance may have been impacted by sample size. Notwithstanding, it may be difficult to disguise the purpose of either the REI or 5F-Wel in future studies with participants. When taking either assessment, it may be obvious to the respondent that higher scores suggest greater levels of EcoWellness and Wellness on the scales. Researchers would be wise to invite participants to answer the questions as honestly as possible in their verbal and written directions of the instrument and not to deflate or inflate their scores. Anonymity should be guaranteed where possible to help researchers receive candid responses to either instrument. It is also possible that in the current study participants who self-selected themselves to be part of the study were nature-lovers. As such, they may have wanted to show how EcoWell they were, thus impacting the social desirability of responses. Various other explanations may serve to explicate the relationships found when assessing this hypothesis, and more research should be conducted with consideration to the above recommendations to increase the validity of the responses to the REI in future administrations.

Hypothesis 7

The researcher not did explicitly state a hypothesis in regard to the exploratory research question of whether certain demographic factors would predict a significant proportion of variance in the REI and its subscales. The researcher ran a series of eight multiple regressions in assessing this hypothesis using a Bonferonni correction. Thus, the alpha level for statistical significance was decreased to .00625. The demographic factors included in these supplementary analyses consisted of mostly transformed dichotomous demographic questions taken from the 5F-Wel. They included college status (college

graduate or not), terminal degree status (yes/no), Caucasian status (yes/no), sexuality (heterosexual or not), marital status (yes/no) full-time employment (yes/no), biological sex, and three other questions related to EcoWellness, (i.e., current perceived level of EcoWellness, importance of EcoWellness, and hours spent with nature). The proportion of variance accounted for by each of the eight multiple regression models ranged between 24.7% and 55.4%. Generally speaking and across the eight regression analyses, identifying as Caucasian, reporting a high level of EcoWellness, rating EcoWellness as important, and reporting greater numbers of hours spent with nature positively predicted Overall EcoWellness.

Several of the results in relation to this particular research question make intuitive sense. The greater the perceived level of EcoWellness, importance of EcoWellness, and the higher the number of hours spent in nature, the higher the resultant scale or subscale scores. What is not intuitive is the result suggesting that being Caucasian somehow positively impacts EcoWellness. Such a finding may most likely be an artifact of the sample. Roughly 81.6% of the sample identified as Caucasian with limited participants identifying as Latino(a), African-American, or of Asian descent. It is possible that with greater representation, a broader range of scores resulted for the Caucasian demographic, whereas not enough representation from other ethnic groups was obtained, thus skewing the results. One implication, which has been a recurrent theme throughout the discussion, is that a broader more representative sample is needed in the future study of the REI. To date, no previous research could be identified that supports the finding that Caucasians are more “EcoWell,” whether it be on account of cultural differences or some other

factor. Thus, this particular result should be interpreted with caution and more research should be conducted with a more diverse sample in assessing the REI. In addition, studies of EcoWellness across cultures may provide further support for the underlying constructs and their meaning.

Major Findings of EcoWellness

The findings of the hypothesis testing have just been discussed. Overall, the REI shows promise and the results support a slightly revised model of EcoWellness. The purpose of this section is to summarize the major findings related to EcoWellness. A revised model of EcoWellness is described and several links to wellness are explored.

In Chapter II the researcher presented a three-order model of EcoWellness. Chapter III included hypotheses related to this three-factor model. The three-order model built upon the EcoWellness model presented by Reese and Myers (2012) that originally included access, environmental identity, and transcendence as the main constructs representing EcoWellness. The authors also broke transcendence down further into Spirituality and Community Connectedness. The researcher built upon this first rendition of EcoWellness after a thorough review of the literature by breaking access down to Physical Access and Sensory Access; he also broke environmental identity down to Connection, Protection, and Environmental Identity. It was assumed that the higher order factor of EcoWellness would facilitate the relationships between the second-order factors (access, environmental identity, and transcendence) and their corresponding first-order factors (Physical Access, Sensory Access, Connection, Protection, Preservation, Spirituality, and Community Connectedness).

The results of this study presented a mixed picture. The model fit indices of a second-order model were supported while the syntax of a third-order model could not even be run on account of high correlations between several of the seven lower-level factors. Thus, a third-order factor was not supported and the constructs of access, environmental identity, and transcendence are no longer supported. Their respective proposed lower-level factors remain stand-alone factors connected through the higher-order factor of EcoWellness (see Appendix P). All of the construct definitions remain the same as those presented in Chapters II and III. While the factor structure remains consistent with previous research and the EcoWellness construct as it was proposed, several of the seven lower-level factors are highly correlated with one another, suggesting that they represent similar if not identical traits. The researcher attempted combining the scales into a single factor of EcoWellness, but the model possessed poor model fit, suggesting that a seven-factor model of EcoWellness is superior. Thus, the researcher maintains that the constructs underlying the REI remain distinct, but further work may need to be done in making items more unique to each scale should the identified factor structure be confirmed in future studies.

The REI possessed some interesting relationships with Total Wellness. Physical Access, Spirituality, and Community Connectedness were statistically significant predictors of Total Wellness. Although such relationships are tentative, the findings seem to suggest that having Physical Access, combining nature activities into one's spirituality, and communing with others in nature may be important factors in enhancing holistic wellness. The results indicated that enhancing EcoWellness in general might be

predictive of holistic wellness. Given the high correlations between several of the subscales of the REI, it remains inconclusive how the subscales are distinct from one another, if at all. More research is needed to differentiate between the subscales or to further confirm the relationships found between the subscales. Knowing which constructs are paramount in EcoWellness will help researchers and practitioners further specify which aspects of the human-nature relationship are most beneficial to human wellness.

Limitations

Several interesting findings have emerged from the data analyses. Nonetheless, several methodological, sampling, and measurement limitations impact the ability for the results of the study to be generalized to populations beyond the Researchmatch.org population represented in this study. One possible methodological limitation of the study included the submission of ten redundant emails. This finding suggests that a minimum of at least ten participants completed the REI and the accompanying instruments twice. The redundant data may have impacted the validity of the study. This artifact was detected when the researcher went to identify and randomly select winners of the drawing for the six gift cards. The only way for participants to access the webpage to fill out one's email address was to complete the entire study, suggesting that ten persons completed the assessment twice. With as many persons that completed the study, the researcher is skeptical whether having redundant data impacted the outcomes of the study. However, the results of this study should be interpreted with caution and further research is needed to replicate and extend the study findings.

In addition, the study did not include an experimental design. It is possible that alternative explanations might account for the relationships between the scale and subscales of the REI along with relationships with the other scales that were included in the study. For example, the trait of physical exercise or socioeconomic status may have contributed to the empirical relationships between the REI and its subscales. Future studies might utilize experimental approaches to identify what factors contribute to the different aspects of EcoWellness. Thus, however intellectually stimulating some of the findings may have been, the above-referenced limitations impact the study's generalizability and validity, warranting future replication of this study with a more stringent methodology.

Furthermore, the researcher recruited a simple random sample of participants from the Researchmatch.org database. While a random sample was acquired that was generalizable to the population of Researchmatch.org, the researcher was unable to generalize the results beyond the population from which the sample was obtained. The database included primarily Caucasian, heterosexual females who were also highly educated. Thus, more research is needed with participants that are more representative a broader population more inclusive of ethnicity, gender, and age. In a similar vein, a survey design typically includes non-respondents. While the researcher achieved nearly a 70% respondent rate, it is possible that non-participants within the sample possessed characteristics that may have altered the outcomes of this study. Participants might have also responded to the survey study in ways that were socially desirable. Some study findings suggested that socially desirable responding played a role in the study outcomes,

albeit a minor one. However, it is possible that socially desirable responding impacted the results.

Finally, several measurement issues presented themselves in this study. Most of the obtained reliability coefficients (i.e., Cronbach's Alpha) were reported as adequate to excellent. However, the internal consistency obtained for the M-C 1(10) was below .70, suggesting instability within the instrument. Thus, the results including social desirability should be interpreted with caution. The REI possessed adequate to excellent internal consistency in this study, but some of the subscales of the REI possessed disattenuated correlations at or above the cutoff (i.e., .850) for this study. This finding limits the discriminant validity of the REI and EcoWellness as a construct. As it stands, four of the subscales (i.e., Connection, Spirituality, Physical Access, and Sensory Access) of the REI are so highly correlated that each seems to be assessing nearly the same trait. Therefore, more research is needed in further testing the validity of the REI and the EcoWellness construct.

Implications

This study included the exploration of an instrument operationalizing EcoWellness. Its initial validity and reliability were tested and its factor structure has been elucidated in preparation for future testing. Overall, the findings of the study provided a mixed picture of EcoWellness. Despite the study's limitations, the results of this study may have implications for counselor education, counseling practice, and EcoWellness theory and research.

Counselor Education

The results of this study have several implications for counselor education. Currently, many counselor education programs integrate the Wheel of Wellness (Witmer & Sweeney, 1992) and the IS-Wel (Myers & Sweeney, 2008) into their curriculum. Reese and Myers (2012) described EcoWellness as the missing link in these and other multidisciplinary wellness models. Thus, when surveying the wellness models of counseling in a Developmental Perspectives or Professional Identity course, counselor educators could also incorporate and discuss nature as an important aspect of holistic wellness. They might also share or invite students to think how they might ethically, legally, and effectively integrate nature into counseling settings as a way to meet the diverse needs of their future clientele.

A growing number of specialty degrees and certificates have been developed in the field of applied ecopsychology (Macy & Doherty, 2010). These programs train individuals to integrate nature into counseling and therapy. However, few articles have been identified where counselor educators describe the integration of nature into the field of counselor education (Davis & Atkins, 2004, 2009). Scholarly writings that have been published by counselor educators include the use of specific ecotherapy strategies as a means to help enhance the wellness of clients (i.e., the use of stones in therapy). Therefore, as the multidisciplinary evidence of nature's impacts on wellness continue to expand and as the study of EcoWellness is expanded in counseling, counselor educators ought to consider how and where nature fits into their curriculum as an additional approach to enhancing client wellness.

Professional Counseling Practice

Given that the REI is in the early stages of development, it may be premature to encourage professional counselors to integrate the REI into counseling assessment with clients wanting to enhance wellness through their connections with nature. Therefore, counselors who gain permission to use the instrument with clients should use the REI as a conversation tool rather than a diagnostic tool. Any interpretations of the REI and its subscales should be applied with caution as the scale and subscales are still tentative.

Physical Access, Spirituality, and Community Connectedness emerged as significant predictors of Total Wellness in this study. Professional Counselors should consider briefly asking about a client's connection with nature and whether that connection or the experience of nature brings about perceived wellness. If so, it may be worthwhile to talk with clients about their level of physical access with nature and how they spend their time in nature. A discussion of spirituality at that point might also be warranted, depending on the client's presenting concerns. Family and couples counselors who have access to a nature setting might consider integrating nature into their work, given that Community Connectedness has also been linked with wellness in this study and in others. Finally, counselors who specialize working with youth or adults presenting with ADHD should keep themselves informed on the latest nature research and how nature exposure can mitigate ADHD symptoms and anxiety (Faber Taylor & Kuo, 2011). Helping parents or caregivers plan and provide safe, non-directed access to green spaces might be a low-cost method to effectively alleviating ADHD symptoms in their youth. Counselors who have knowledge in nature-based interventions might also teach parents

or caregivers how to integrate intentional interaction in or with nature, helping a child or adolescent deepen their connection with nature through learning about natural spaces, recycling, or talking about spirituality relative to one's connection with nature.

There currently exists a variety of adventure-based and wilderness-based programming in and out of the United States. Such programs should discover ways of more intentionally integrating nature into core therapeutic processes, given that they largely view nature as more of a backdrop than as an active co-facilitator of therapy (Beringer, 2004). In the coming years, it is quite possible that the REI could be a useful tool in helping such programs identify potential clients that would be most likely to benefit from nature-based programming. A firmer factor structure need be determined prior to integrating the REI into adventure-based programming, but one day incorporating a measure like the REI as an assessment battery in nature-based programming might allow programs to be more intentional and successful with the youth they enroll. Thus, while caution should be used in employing the REI at this stage of development, the findings of this study extend and support the use of nature in many ways to promote the wellness of clients.

Finally, counselors who both are and are not interested in the integration of nature into professional counseling should consider surveying what types of counseling interventions their clients prefer. Depending on culture and geographic location, clients may prefer the integration of nature and EcoWellness in counseling settings in addition to standard talk therapy. Thus, a survey study that explores the therapeutic interests of clients may be a worthy inquiry. Second, more research is needed to determine how

counselors integrate nature into their practice and which theories or models undergird their approaches. Findings may provide implications for professional advocacy and Psychoeducation with counselors in regard to how nature can be more intentionally integrated into nature practice to promote client wellness. Several additional theoretical and research implications emerged from the outcomes of this study.

Theory and Future Study of EcoWellness

Much has already been discussed about the theoretical implications of this study directly on the model of EcoWellness as proposed by Reese and Myers (2012) and further delineated in Chapter II. EcoWellness was proposed as a universal concept. More research is needed to further substantiate or bring clarification to the factor structure of the REI with a sample more representative of the general population. Doing so will confirm or refute the REI's factor structure derived from this study and also provide additional implications for EcoWellness theory. Should group differences arise (e.g., gender or ethnic differences) in the evaluation of the factor structure of the REI, more research can be conducted to further determine how such groups differ and quite possibly lead to the running of sub-group CFAs. Future research should also be conducted across cultural contexts. If variations occur within national subpopulations, it seems possible that even more drastic differences may emerge when comparing persons from different geographic regions of the world.

Furthermore, if the current factor structure of the REI is once again confirmed and several of the subscales possess similarly strong relationships with a more diverse population, a modification of items should be considered. Item modifications and

additions should be done to make the subscales more distinct, thus decreasing the relationships found between the constructs. Future research should also be conducted to explore how the REI and its subscales impact the different factors of the IS-Wel. Different aspects of wellness may be impacted more than others. For example, Reese, Lewis, Myers, Wahesh, and Iversen (in press) found that the Experience factor of Nature Relatedness was more closely associated with Physical Wellness than any other aspect of wellness in studying a sample of undergraduate students. Given that relationship, it is possible that EcoWellness will also be more closely associated with Physical Access. A complementary qualitative inquiry might include the use of phenomenology in exploring how specific populations define and use nature in their lives for their own benefit and that of nature. Findings may have implications for supplementing or changing a model of EcoWellness and providing further support for how nature impacts holistic wellness. Given that EcoWellness has only recently been developed, much more research using a variety of populations and methodologies are needed before any firm conclusions about the construct can be made.

Conclusion

The purpose of this study was to investigate the initial validity and reliability of the Reese EcoWellness Inventory. An analysis of the results suggested an alternative factor structure than what has been previously suggested (Reese & Myers, 2012), with a higher order of EcoWellness and the original seven lower-order factors. Overall, the REI seems to lack complete discriminant validity, and it may be vulnerable to socially desirable responding. However, the REI demonstrated promise in effectively assessing

EcoWellness and was predictive of Total Wellness. The development and testing of the REI provides an initial empirical foundation for the integration of nature into professional counseling and counselor education. Further research is needed to replicate and extend the study findings through utilizing a sample that is more inclusive of national and cross-cultural distributions of demographic characteristics such as age, gender, and ethnicity.

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APPENDIX A

ORIGINAL ECOWELLNESS CONSTRUCT DEFINITIONS REVIEWED BY EXPERT REVIEWERS

EcoWellness: a sense of appreciation, respect for, and awe of nature that results in feelings of connectedness with the natural environment and the enhancement of holistic wellness

I. **Access**: The ability to physically be in and experience nature with one's senses.

- a. *Physical Access*
  - i. Living, working, socializing, or recreating in, near, or with places, spaces, or species that the individual considers nature
  - ii. The perception of tranquility, safety, or security when accessing nature
  - iii. A sense of seclusion or being away from one's typical environment
- b. *Sensory Access*
  - i. Being able to touch nature either indoors or outdoors on a regular basis
  - ii. Being able to taste nature either indoors or outdoors on a regular basis
  - iii. Being able to smell nature either indoors or outdoors on a regular basis
  - iv. Being able to view nature either indoors or outdoors on a regular basis
  - v. Being able to hear nature either indoors or outdoors on a regular basis

II. **Environmental Identity**: the extent to which the individual incorporates nature into his or her self-concept

- a. *Connection*
  - i. Experiencing pleasant cognitions (including memories) while reflecting on one's relationship with nature
  - ii. Having positive emotions while reflecting on one's association with nature
  - iii. Feeling united with nature when in or away from its presence
  - iv. Experiencing pleasant cognitions when in or with nature
  - v. Having positive emotions while in or with nature
  - vi. Having a special place (or places) in nature that elicit(s) strong, positive emotions and cognitions
  - vii. The active use of nature as a method for recreation or coping with life stressors
- *b. Protection*
  - i. Knowledge about elements of nature that can be of benefit to holistic wellness
  - ii. Incorporating elements of nature into one's lifestyle that can be of benefit to holistic wellness
  - iii. Knowledge about species or natural elements that can bring harm to the individual.
  - iv. Possessing an appropriate level of fear of species or natural elements that can bring harm to the individual.
  - v. Taking precautions when in the presence of or near species or natural elements that can bring harm to the individual.
- *c. Preservation*
  - i. Having an awareness about an environmental cause (i.e., recycling)
  - ii. Experiencing strong emotions in regard to an environmental cause
  - iii. Taking action related to an environmental cause

III. **Transcendence**: the ability to experience solidarity with entities outside the self when accessing nature and expanding awareness about one's role or sense of purpose relative to the human and non-human community

a. *Spirituality*
   i. A perceived connection with one's conception of a higher power
   ii. A sense of closeness with one's life-guiding beliefs and values
   iii. The ability to appreciate, find inner peace, and have respect for all things that have lived, currently live, and have yet to live

b. *Community connectedness*
   i. Considering the needs of other living things as much as one's own needs when exposed to nature
   ii. A sense of social reciprocity and harmony with others
   iii. Compassionate and generous acts and attitudes toward others when exposed to nature
   iv. A greater sense of interconnectedness with the human and non-human community through contact with nature, including one's self-defined culture

APPENDIX B

ECOWELLNESS CONSTRUCT REFINEMENT—EXPERT REVIEW QUESTIONS

I am asking for your feedback in regard to an outline of the item categories and definitions for EcoWellness, which is attached. The construct definitions (or item categories) are based in the multidisciplinary literature and are relatively solidified for the pre-study dissertation process. At this stage of developing an instrument in which EcoWellness is operationalized, I want to ensure that I have unidimensional item definitions. The next phase will include the development of a pool of items, based off of the integrated feedback I receive on the item definitions.

I ask that you please comment on the following aspects of the item definitions and categories:

As they stand, are the item definitions unidimensional?

What item definitions, if any, are confusing? Which ones require more explanation? Less explanation?

Which item definitions might you see as being redundant?

Given the definition(s) of EcoWellness and its categories, do you feel as though any item definitions might be missing? If so, which ones?

What questions are you left asking after going through the construct definitions and categories?

Any other comments or concerns

APPENDIX C

ECOWELLNESS CONSTRUCT DEFINITIONS FOLLOWING EXPERT REVIEW

EcoWellness: a sense of appreciation, respect for, and awe of nature that results in feelings of connectedness with the natural environment and the enhancement of holistic wellness

EcoWellness was proposed as having <u>three</u> dimensions:

I. **Access (A)**: The ability to physically be in and experience nature with one's senses.

- a. *Physical Access (PA): Having physical access to nature*
  - i. Living, working, socializing, or recreating in, near, or with places or species that the individual considers nature
  - ii. The ability to physically access nature at one's discretion
- b. *Sensory Access (SA): Being close to nature through one's senses, even in the absence of physical access to nature.*
  - i. Being able to touch nature
  - ii. Being able to smell nature
  - iii. Being able to see nature
  - iv. Being able to hear nature

II. **Environmental Identity (EI)**: the extent to which the individual incorporates nature into his or her self-concept and lifestyle through connection, protection, and preservation

- a. *Connection (C)*
  - i. Experiencing pleasant cognitions (including memories) while reflecting on one's relationship with nature
  - ii. Having positive emotions while reflecting on one's association with nature
  - iii. Having a special place (or places) in nature that elicit(s) positive emotions and cognitions
  - iv. Having at least one activity in or with nature that one incorporates into a self-definition
- *b. Protection (Pt)*
  - i. Incorporating elements of nature into one's lifestyle that can be of benefit to one's survival
  - ii. Taking precautions that would promote one's survival when in the presence of or near species or natural elements that can bring harm to the individual.
- *c. Preservation (Pv)*
  - i. Taking action(s) related to an environmental cause

III. **Transcendence**: the ability to experience solidarity with entities outside the self when accessing nature and expanding awareness about one's role or sense of purpose relative to the human and non-human community

- *a. Spirituality*

i. A perceived connection with one's conception of a higher power or life-guiding beliefs when in the presence of nature
ii. The ability to find inner peace when in the presence of nature
iii. A sense of seclusion and being away from one's typical environment

b. Community connectedness

i. A greater sense of interconnectedness with the human and non-human community through contact with nature
ii. Compassionate and generous acts toward others when exposed to nature

APPENDIX D

INITIAL ITEM POOL OF THE REESE ECOWELLNESS INVENTORY (REI)

(*N* = 148 items)

Item Key

A = Access
- PA i-ii = Physical Access i-ii (n = 24 items)
- SA i-iv = Sensory Access i-iv (n = 27 items)

EI = Environmental Identity
- C i-iv = Connection i-iv (n = 29 items)
- Pt i-ii = Protection i-ii (n = 19 items)
- Pv = Preservation (n = 8 items)

T = Transcendence
- Si i-iii = Spirituality i-iii (n = 28 items)
- CC i-ii = Community Connectedness i-ii (n = 13 items)

Items

A_{PAi01}: I live near trees and plants.
A_{PAi02}: Wherever I go there is nature.
A_{PAi03}: Nature surrounds me in my daily life.
A_{PAi04}: Plants and animals are absent from my day-to-day surroundings.
A_{PAi05}: I socialize in nature.
A_{PAi06}: I spend time with friends in nature.
A_{PAi07}: I lack relationships that occur in nature.
A_{PAi08}: There is nature close to the place I spend most of my day.
A_{PAi09}: I have hobbies that involve nature.
A_{PAi10}: I recreate in nature.
A_{PAi11}: I am active in nature.
A_{PAi12}: I avoid other species.
A_{PAi13}: Nature is far away from where I live.
A_{PAi14}: None of my hobbies include nature.
A_{PAi15}: Other species live near me.
A_{PAi16}: I have pets in my home.
A_{PAi17}: The places I go every day are near nature.

A_{PAii01}: I can access nature whenever I choose.
A_{PAii02}: Getting to nature requires little effort.
A_{PAii03}: Nature is too far away.
A_{PAii04}: Nature is difficult to access.
A_{PAii05}: Nature is hard for me to get to on a consistent basis.
A_{PAii06}: It is easy to find nature nearby.
A_{PAii07}: Nature is out of my reach.

A_{SAi01}: I pet domesticated animals.
A_{SAi02}: I touch plants.
A_{SAi03}: I avoid touching animals.
A_{SAi04}: I collect raw fruits and vegetables from a garden or farm.
A_{SAi05}: I do not touch plants.
A_{SAi06}: Touching wildlife is not uncommon for me.

A_{SAii01}: There are smells of nature in and around my home.
A_{SAii02}: The scent of nature is around me most of the day.
A_{SAii03}: When I walk outside I smell the plants and trees.
A_{SAii04}: I use fragrances that smell like elements of nature.
A_{SAii05}: My day lacks smells of nature.
A_{SAii06}: The smell of pollution fills my day.

$A_{SAiii01}$: I can see nature from my home.
$A_{SAiii02}$: The place I spend most of my time lacks a view to nature.
$A_{SAiii03}$: When I step outside I see buildings.
$A_{SAiii04}$: Just outside my door are plants and trees.
$A_{SAiii05}$: I see wild animals during the day.
$A_{SAiii06}$: Nature is visible from my home.
$A_{SAiii07}$: I have photos or artwork of nature within eyesight during the day.
$A_{SAiii08}$: When I look out a window I see buildings or concrete.

A_{SAiv01}: It is not difficult to hear nature throughout the day.
A_{SAiv02}: When I step outside I hear nature.
A_{SAiv03}: I listen to sounds of nature.
A_{SAiv04}: I have to listen hard in order to hear nature.
A_{SAiv05}: I can hear nature from my home.
A_{SAiv06}: The sounds of the places I am in cover up the sounds of nature.
A_{SAiv07}: It is uncommon for me to hear nature.

EI_{Ci01}: I have good memories of nature.
EI_{Ci02}: Nature brings about pleasant thoughts.
EI_{Ci03}: I can recall times I have enjoyed in nature.
EI_{Ci04}: Nature causes me to think good thoughts.
EI_{Ci05}: Important life events happened in nature.
EI_{Ci06}: I have had good times in nature.
EI_{Ci07}: My memories of nature are negative.
EI_{Ci08}: I can't remember a time where I enjoyed nature.

EI_{Cii01}: My relationship with nature makes me feel good.
EI_{Cii02}: I associate nature with happiness.
EI_{Cii03}: My experiences in nature make me happy.
EI_{Cii04}: I feel like I can be myself in nature.
EI_{Cii05}: I have positive emotions about nature.
EI_{Cii06}: I feel good about myself when in nature.
EI_{Cii07}: I feel sad when I recall experiences in nature.

EI_{Ciii01}: I have a favorite place in nature.
EI_{Ciii02}: I can recall having a special place in nature.
EI_{Ciii03}: There is a place in nature that brings about feelings of contentment.
EI_{Ciii04}: I grew up having a favorite place in nature.
EI_{Ciii05}: I feel good in certain places in nature.
EI_{Ciii06}: I have a favorite spot in nature.
EI_{Ciii07}: There is a certain place I go in nature.
EI_{Ciii08}: I can't recall a place in nature that brings about positive feelings.

EI_{Civ01}: Having a hobby in nature makes me who I am.
EI_{Civ02}: I would not be complete without activity in nature.
EI_{Civ03}: I would not be complete without nature.
EI_{Civ04}: Nature is a big part of who I am.
EI_{Civ05}: I include nature when describing myself to others.
EI_{Civ06}: Nature is not included in my definition of self.

EI_{Pti01}: I know where the food I eat comes from.
EI_{Pti02}: I include elements of nature into my diet.
EI_{Pti03}: I use renewable energy when I am able.
EI_{Pti04}: I can grow my own food.

EI_{Pti05}: I eat fast food several times a week.
EI_{Pti06}: I do not know where my food comes from.
EI_{Pti07}: Renewable energy is a waste of my time.
EI_{Pti08}: I lack the knowledge to grow my own plants for food.
EI_{Pti09}: I own or take part in a community garden.

EI_{Ptii01}: I avoid getting too close to animals and plants that I know could harm me.
EI_{Ptii02}: I know my limits in nature.
EI_{Ptii03}: I keep a distance from forces in nature that could hurt me.
EI_{Ptii04}: I understand when nature can be dangerous.
EI_{Ptii05}: I carry a first aid kit when in nature.
EI_{Ptii06}: I stay clear of danger in nature.
EI_{Ptii07}: I am aware of species that can bring harm to me.
EI_{Ptii08}: Nature cannot harm me.
EI_{Ptii09}: I am smarter than plants and animals.
EI_{Ptii10}: I know how to fend for myself when it comes to nature.

EI_{Pv01}: I feel strongly about an environmental cause.
EI_{Pv02}: I take action on an environmental issue.
EI_{Pv03}: Having a positive impact on the health of nature is important to me.
EI_{Pv04}: I do my part in preserving nature.
EI_{Pv05}: If I see litter on the ground I pick it up.
EI_{Pv06}: I recycle.
EI_{Pv07}: I avoid environmental causes.
EI_{Pv08}: Environmental causes are a waste of my time.

T_{Si01}: I feel close to a higher power in nature.
T_{Si02}: I become clearer on my beliefs while with nature.
T_{Si03}: My beliefs become clearer to me in nature.
T_{Si04}: I feel spiritually connected to something bigger than myself in nature.
T_{Si05}: I gain clarity on my life's purpose in nature.
T_{Si06}: Nature makes me feel connected to a larger force in life.
T_{Si07}: I feel distanced from my life guiding beliefs when in nature.
T_{Si08}: My purpose in life becomes unclear to me when in nature.

T_{Sii01}: The stresses in my life go away when in nature.
T_{Sii02}: I find peace in nature.

T_{Sii03}: I feel at ease when with nature.
T_{Sii04}: I experience calmness in nature.
T_{Sii05}: Nature helps me calm down when upset.
T_{Sii06}: I go to nature to find peace.
T_{Sii07}: I feel like everything slows down in nature.
T_{Sii08}: I am at peace with myself in nature.
T_{Sii09}: The world's problems go away when I am in nature.
T_{Sii10}: Nature is unsettling to me.
T_{Sii11}: The presence of nature causes me to feel discomfort.

T_{Siii01}: When in nature I feel far away from my usual obligations.
T_{Siii02}: I feel a sense of privacy in nature.
T_{Siii03}: Nature provides me with solitude.
T_{Siii04}: Nature provides me a sense of being away.
T_{Siii05}: Being in nature provides me with a sense of being away.
T_{Siii06}: My commitments seem to fade away when in nature.
T_{Siii07}: My problems become overbearing in nature.
T_{Siii08}: I feel tenser in nature.
T_{Siii09}: Nothing else matters while in nature.

T_{CCi01}: I feel a sense of community with others when in nature.
T_{CCi02}: I feel close to others when in nature.
T_{CCi03}: Experiences with others in nature deepen my relationships with them.
T_{CCi04}: I feel connected to all of life when in nature.
T_{CCi05}: Exposure to nature brings about unity with all things.
T_{CCi06}: Being around others in nature causes me to feel less close to them.
T_{CCi07}: I experience a sense of disconnection from all that exists when in nature.

T_{CCii01}: When in nature I am more giving.
T_{CCii02}: I feel compassionate towards others in nature.
T_{CCii03}: Exposure to nature makes me want to give to others.
T_{CCii04}: I give less of myself to others around nature.
T_{CCii05}: I reach out to others in nature.
T_{CCii06}: I am selfish in nature.

APPENDIX E

EXAMPLE EXPERT REVIEW FORM FOR REESE ECOWELLNESS INVENTORY

Section I: Purpose and Directions Feedback

Purpose

The purpose of this inventory is to assess the level at which nature is incorporated in your life. Answer each item in a way that is true for you most of the time. Answer all items and do not spend too much time on any one item.

In answering items, think of nature as you would define it in regard to your interactions with other living systems and non-human species.

Instructions

Mark your answers on the bubble sheet. Please ensure that the Identification # on your bubble sheet matches that of the ID# at the top of page 7. Use a number two lead pencil. Begin by filling in the following information on your bubble sheet:

sex (male or female)
highest grade completed
birth date

Mark only one answer for each item using this scale:

Answer Strongly Agree (A)	if it is always true for you.
Answer Agree (B)	if it is true for you most of the time.
Answer Disagree (C)	if it is mostly not true for you.
Answer Strongly Disagree (D)	if it is never true for you.

Answer each item in a way that is true for you most of the time.

Example

If you like to be in nature "some of the time" mark "Agree" on your bubble sheet, as shown below.

	Strongly Agree	Agree	Disagree	Strongly Disagree
I like to be in nature.	A	~~B~~	C	D

REI Purpose and Directions Feedback

1. Is the purpose of the assessment clear? As a research participant, would you understand why you are taking the assessment?

2. Is the definition of 'nature' clear? If it is not, how might it be restated to enhance understanding?

3. Are the instructions clear? What, if anything, is confusing to you or potentially to others?

4. Is the Likert-scale format easy to interpret and is it explained in a way that is understandable to others? If not, what might you change?

5. Is the example provided clear and appropriate?

6. Additional comments.

Section II: REI Item Review Feedback

Reviewer Directions

Please rank each item on a one to seven point scale with '1' indicating *Not at all in agreement* with the above definition for this section to '7' indicating *Totally in agreement* with the above definition for this section. The higher you rate the item, the more you agree that it represents the associated definition. Please highlight the appropriate number in the ranking box. The items that will be reverse scored are indicated as such. Please feel free to use track changes if you would like to provide feedback directly on an item.

Not at all in Agreement	Neutral/ Uncertain	Totally in Agreement

[---------- 1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 ---------- 6 ---------- 7 ----------]

How items are broken down

The REI is proposed to assess one's EcoWellness, the extent to which an individual experiences wellness through their perceived connection with nature. It includes the dimensions of Access, Environmental Identity, and Transcendence. Each proposed dimension is broken down further into sub-dimensions. To assist in your understanding, the overarching construct definitions are listed immediately below. In parentheses, the construct sub-dimensions are highlighted.

1. Access [A] (*Physical Access i-ii; Sensory Access i-iv*): The ability to physically be in and experience nature with one's senses

2. Environmental Identity [EI] (*Connection i-iv; Protection i-ii; Preservation*): the extent to which the individual incorporates nature into his or her self-concept and lifestyle through connection, protection, and preservation

3. Transcendence [T] (*Spirituality i-iii; Community Connectedness i-ii*): the ability to experience solidarity with entities outside the self when accessing nature and expanding awareness about one's role or sense of purpose relative to the human and non-human community

Physical Access i: Living, working, socializing, or recreating in, near, or with places or species that the individual considers nature

Item #	Item	Ranking "1" to "7"	Reviewer comments (questions, wording, editorial feedback, and other suggestions)
A_{PAi01}	I live near trees and plants.	1 2 3 4 5 6 7	
A_{PAi02}	Wherever I go there is nature.	1 2 3 4 5 6 7	
A_{PAi03}	Nature surrounds me in my daily life.	1 2 3 4 5 6 7	
A_{PAi04}	Plants and animals are absent from my day-to-day surroundings. (reverse scored)	1 2 3 4 5 6 7	
A_{PAi05}	I socialize in nature.	1 2 3 4 5 6 7	
A_{PAi06}	I spend time with friends in nature.	1 2 3 4 5 6 7	
A_{PAi07}	I lack relationships that occur in nature. (reverse scored)	1 2 3 4 5 6 7	
A_{PAi08}	There is nature close to the place I spend most of my day.	1 2 3 4 5 6 7	
A_{PAi09}	I have hobbies that involve nature.	1 2 3 4 5 6 7	
A_{PAi10}	I recreate in nature.	1 2 3 4 5 6 7	
A_{PAi11}	I am active in nature.	1 2 3 4 5 6 7	
A_{PAi12}	I avoid other species. (reverse scored)	1 2 3 4 5 6 7	
A_{PAi13}	Nature is far away from where I live. (reverse scored)	1 2 3 4 5 6 7	
A_{PAi14}	None of my hobbies include nature. (reverse scored)	1 2 3 4 5 6 7	
A_{PAi15}	Other species live near me.	1 2 3 4 5 6 7	
A_{PAi16}	I have pets in my home.	1 2 3 4 5 6 7	
A_{PAi17}	The places I go every day are near nature.	1 2 3 4 5 6 7	

APPENDIX F

THOUGHTS, FEELINGS, & BEHAVIORS ECOWELLNESS TABLE

Physical Access i: Living, working, socializing, or recreating in, near, or with places or species that the individual considers nature

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
A_{PAi01}	1. Plants and trees can be seen on the same street I live on.			X	Reworded
A_{PAi02}	2. I am attuned to nature wherever I go.		X		Reworded
A_{PAi03}	3. Nature surrounds me in my daily life.			X	
A_{PAi04}	4. Animals are present in my day-to-day surroundings.			X	Reworded
A_{PAi08}	5. It is important for me to have nature in my daily life.		X		Reworded
A_{PAi09}	6. I have hobbies that include nature.			X	Reworded
A_{PAi13}	7. Nature is within walking distance from where I live.	X			Reworded
A_{PAi17}	8. The places I go every day are near nature.			X	
A_{PAi18}	9. Even when in a car on the freeway, I am aware of the nature around me.	X			Added
A_{PAi19}	10. My access to nature makes me feel good.		X		Added
A_{PAi20}	11. Accessing nature is essential to me.	X			Added

Deleted: A_{PAi05} A_{PAi06} A_{PAi07} A_{PAi10} A_{PAi11} A_{PAi12} A_{PAi14} A_{PAi15} A_{PAi16}; Added: A_{PAi18} A_{PAi19} A_{PAi20}

Physical Access ii: The ability to physically access nature at one's discretion

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
A_{PAii01}	12. I can access nature whenever I choose.			X	
A_{Paii02}	13. Getting to nature requires little effort.			X	
A_{Paii06}	14. It is easy for me to find nature nearby.	X			
A_{Paii08}	15. I feel satisfied with my level of access to nature.		X		Added

Deleted: A_{Paii03} A_{Paii04} A_{Paii05} A_{Paii07}; Added: A_{Paii08}

Sensory Access i: Being able to touch nature.

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
A_{Sai01}	16. I enjoy petting domesticated animals.		X		Reworded
A_{Sai02}	17. I touch plants.			X	
A_{Sai06}	18. Physical touch with nature is important to me.	X			

Deleted: A_{Sai03} A_{Sai04} A_{Sai05}; Added: A_{Sai06}

Sensory Access ii: Being able to smell nature.

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
A_{SAii01}	19. There are smells of nature in and around my home.			X	
A_{SAii03}	20. When I walk outside I can smell the plants and trees.			X	
A_{SAii07}	21. I enjoy the smells of nature.	X			Added
A_{SAii08}	22. I seek opportunities to smell nature.			X	Added
A_{SAii09}	23. I am happy when I can smell nature.		X		Added
A_{Saii10}	24. Smells of nature are among life's greatest pleasures.	X			Added

Deleted: A_{SAii02} A_{SAii04} A_{SAii05} A_{SAii06}; Added: A_{SAii07} A_{SAii08} A_{SAii09} A_{SAii10}

Sensory Access iii: Being able to see nature.

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
$A_{SAiii01}$	25. I can see nature from my home.			X	
$A_{SAiii02}$	26. The place I spend most of my time includes a view to nature.			X	Reworded
$A_{SAiii07}$	27. I have photos or artwork of nature within eyesight during the day.			X	
$A_{SAiii08}$	28. It is important for me to be able to see nature from my home.	X			Added
$A_{SAiii09}$	29. It is important for me to be able to see nature from my place of work.	X			Added
$A_{SAiii10}$	30. I need to see nature each day.		X		Added
$A_{SAiii11}$	31. I have plants in my home.			X	Added
$A_{SAiii12}$	32. I like to have plants inside my home.	X			Added
$A_{SAiii13}$	33. I feel less stress when I see nature.		X		Added

Deleted: $A_{SAiii03}$ $A_{SAiii04}$ $A_{SAiii05}$ $A_{SAiii06}$ Added: $A_{SAiii08}$ $A_{SAiii09}$ $A_{SAiii10}$ $A_{SAiii11}$ $A_{SAiii12}$ $A_{SAiii13}$

Sensory Access iv: Being able to hear nature.

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
A_{SAiv01}	34. I hear nature throughout the day.			X	Reworded
A_{SAiv02}	35. When I step outside I hear nature.			X	Reworded
A_{SAiv03}	36. I listen to recorded sounds of nature.			X	Reworded
A_{SAiv05}	37. I can hear nature from inside my home.			X	Reworded
A_{SAiv08}	38. I like to hear sounds of nature.	X			
A_{SAiv09}	39. Listening to the sounds of nature is important to me.	X			
A_{SAiv10}	40. It calms me to hear sounds of nature.		X		
A_{SAiv11}	41. I relax when I hear nature.		X		
A_{SAiv12}	42. I seek experiences where I can hear the sounds of nature.			X	

Deleted: A_{SAiv04} A_{SAiv06} A_{SAiv07}; Added: A_{SAiv08} A_{SAiv09} A_{SAiv10} A_{SAiv11} A_{SAiv12}

Connection i: Experiencing pleasant cognitions (including memories) while reflecting on one's relationship with nature

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
EI_{Ci01}	43. I have good memories of being in nature.	X			Reworded
EI_{Ci02}	44. Nature brings about pleasant thoughts for me.	X			
EI_{Ci03}	45. I can recall times I have enjoyed being in nature.		X		Reworded
EI_{Ci04}	46. The anticipation of being in nature causes me to think good thoughts.	X			Reworded
EI_{Ci05}	47. Important life events of mine happened while in nature.	X			Reworded
EI_{Ci06}	48. I have had good times in nature.			X	

Deleted: EI_{Ci07} EI_{Ci08}

Connection ii: Having positive emotions while reflecting on one's association with nature

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
EI_{Cii01}	49. My relationship with nature makes me feel good.		X		
EI_{Cii02}	50. I associate nature with happiness.		X		
EI_{Cii03}	51. My experiences in nature make me happy.		X		
EI_{Cii04}	52. I feel like I can be myself in nature.	X			
EI_{Cii05}	53. I have positive emotions about nature.		X		
EI_{Cii06}	54. I feel good about myself when in nature.		X		
EI_{Cii07}	55. I am happiest when in nature.		X		Reworded

Connection iii: Having a special place (or places) in nature that elicit(s) positive emotions and cognitions

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
EI_{Ciii01}	56. I have one or more favorite places in nature.	X			Reworded
EI_{Ciii03}	57. There is a place in nature that brings about feelings of contentment for me.		X		Reworded
EI_{Ciii04}	58. I grew up having at least one favorite place in nature.			X	Reworded
EI_{Ciii05}	59. I feel good about myself when in certain places in nature.		X		
EI_{Ciii06}	60. I have a favorite spot in nature.		X		
EI_{Ciii09}	61. Being anywhere in nature makes me feel good.		X		

Delete: EI_{Ciii02} EI_{Ciii07} EI_{Ciii08}; Added: EI_{Ciii09}

Connection iv: Having at least one activity in or with nature that one incorporates into a self-definition

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
EI_{Civ01}	62. Having a hobby in nature contributes to who I am as a person.	X			Reworded
EI_{Civ04}	63. I include nature when describing myself to others.			X	
EI_{Civ05}	64. My experiences with nature are a big part of who I am.	X			Reworded
EI_{Civ06}	65. Nature is included in my definition of self.	X			Reworded

Deleted: EI_{Civ02} EI_{Civ03}

Protection i: Incorporating elements of nature into one's lifestyle that can be of benefit to one's survival

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
EI_{Pti01}	66. I know where the food I eat comes from.			X	
EI_{Pti03}	67. I use renewable energy when I am able.			X	
EI_{Pti04}	68. I know how to grow my own food.	X			Reworded
EI_{Pti10}	69. I feel good about my carbon footprint.		X		Added
EI_{Pti11}	70. I am concerned about climate change.		X		Added

Deleted: EI_{Pti02} EI_{Pti05} EI_{Pti06} EI_{Pti07} EI_{Pti08} EI_{Pti09}; Added: EI_{Pti10} EI_{Pti11}

Protection ii: Taking precautions that would promote one's survival when in the presence of or near species or natural elements that can bring harm to the individual.

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
EI_{Ptii01}	71. I avoid getting too close to animals that I know could harm me.			X	Reworded
EI_{Ptii02}	72. I know my limits in nature.	X			
EI_{Ptii03}	73. I keep a distance from forces in nature that could hurt me.			X	
EI_{Ptii04}	74. I understand when nature can be dangerous.	X			
EI_{Ptii05}	75. I carry a first aid kit when in nature.			X	
EI_{Ptii10}	76. I avoid getting too close to plants that I know could harm me.			X	Reworded
EI_{Ptii11}	77. Some things in nature are beyond my understanding.	X			Added

Deleted: EI_{Ptii06} EI_{Ptii07} EI_{Ptii08}; Added EI_{Ptii11}

Preservation: Taking action(s) related to an environmental cause

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
EI_{Pv01}	78. I feel strongly about an environmental cause.		X		
EI_{Pv03}	79. Having a positive impact on the health of the planet is important to me.	X			Reworded
EI_{Pv04}	80. I do my part in preserving nature.			X	
EI_{Pv05}	81. If I see litter on the ground I pick it up.			X	
EI_{Pv06}	82. I recycle.			X	
EI_{Pv09}	83. I am satisfied with my efforts to preserve nature.		X		Added

Deleted: EI_{Pv02} EI_{Pv07} EI_{Pv08}; Added: EI_{Pv09}

Spirituality i: A perceived connection with one's conception of a higher power or life-guiding beliefs when in the presence of nature

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
T_{Si03}	84. My beliefs become clearer to me when I am in nature.	X			Reworded
T_{Si04}	85. I feel connected to something bigger than myself when I am in nature.		X		Reworded
T_{Si05}	86. I gain clarity on my life's purpose when I am in nature.	X			
T_{Si06}	87. Nature makes me feel connected to a larger force in life.		X		
T_{Si09}	88. I include aspects of nature in my spiritual practice.			X	Added

Deleted: T_{Si01} T_{Si02} T_{Si08}; Added: T_{Si09}

Spirituality ii: The ability to find inner peace when in the presence of nature

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
T_{Sii01}	89. The stresses in my life seem to go away when I am in nature.		X		Reworded
T_{Sii04}	90. Spending time with nature helps me relax.			X	Reworded
T_{Sii05}	91. Nature helps me calm down when upset.		X		
T_{Sii06}	92. I go to nature to find peace.			X	
T_{Sii07}	93. My thoughts slow down when I am in nature.	X			Reworded
T_{Sii08}	94. I feel at peace with myself when I am in nature.		X		Reworded
T_{Sii09}	95. The world's problems go away when I am in nature.	X			
T_{Sii12}	96.I enjoy my spiritual practices in nature.			X	

Deleted: T_{Sii02} T_{Sii03} T_{Sii10} T_{Sii11}; Added: T_{Sii12}

Spirituality iii: A sense of seclusion and being away from one's typical environment

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
T_{Siii01}	97. When in nature I feel far away from my usual obligations.	X			
T_{Siii02}	98. I experience a sense of privacy in nature.		X		
T_{Siii05}	99. Being in nature provides me with a sense of being away.		X		
T_{Siii06}	100. My commitments seem to fade away when in nature.	X			
T_{Siii09}	101. My problems go away when in nature.		X		Reworded
T_{Siii10}	102. I go to places in nature to get away.			X	Added

Deleted: T_{Siii03} T_{Siii04} T_{Siii07}; Added: T_{Siii10}

Community Connectedness i: A greater sense of interconnectedness with the human and non-human community through contact with nature

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
T_{CCi01}	103. I feel a sense of community with others when together in nature.		X		Reworded
T_{CCi02}	104. I feel close to others when with them in nature.		X		Reworded
T_{CCi03}	105. Experiences with others in nature deepen my relationships with them.			X	
T_{CCi04}	106. I feel connected to all of life when in nature.		X		
T_{CCi05}	107. Exposure to nature brings about unity with all things.		X		

Deleted: T_{CCi06} T_{CCi07}

Community Connectedness ii: Compassionate and generous acts toward others when exposed to nature

Item #	Item	Thoughts	Feelings	Behaviors	Researcher Decision
T_{CCii01}	108. When in nature I am more giving to others.			X	Reworded
T_{CCii02}	109. I feel compassionate towards others when they are with me in nature.		X		Reworded
T_{CCii07}	110. I think about others' needs when in nature.	X			Added
T_{CCii08}	111. When I am in nature, I find myself thinking about others in my life.	X			Added

Deleted: T_{CCii03} T_{CCii04} T_{CCii05} T_{CCii06}
Added: T_{CCii07} T_{CCii08}

APPENDIX G

REESE ECOWELLNESS INVENTORY (111 ITEMS)

Purpose

The purpose of this inventory is to assess the extent to which nature is incorporated in your life and contributes to your sense of wellness. Answer each item to the level that it is true for you. Answer all items and do not spend too much time on any one item.

In answering items, think of nature as you would define it in regard to your interactions with other living systems and non-human species. Nature here not only refers to wilderness settings and native animals, but also includes pets, parks, gardens, and indoor and outdoor plants.

Instructions

Mark your answers on the bubble sheet. Please ensure that the Identification # on your bubble sheet matches that of the ID# at the top of page 8. Use a #2 lead pencil. Begin by filling in the following information on your bubble sheet:

male or female
highest grade completed
birth date

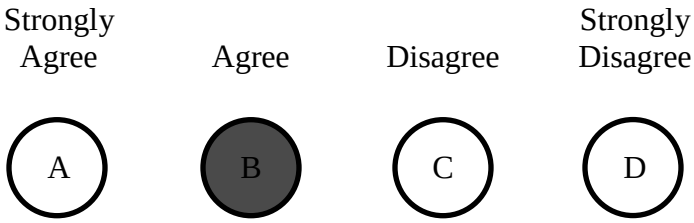
Mark only one answer on your bubble sheet for each item using this scale:

Strongly Agree (A)	if it is true for you most of the time.
Agree (B)	if it is true for you some of the time.
Disagree (C)	if it is usually not true for you.
Strongly Disagree (D)	if it is never true for you.

Example

I have access to nature.

If you were to "Agree" that you have access to nature, you would completely shade in "B" with a #2 pencil on your bubble sheet, as shown below.



1. Plants and trees can be seen on the same street I live on.
2. I am attuned to nature wherever I go.
3. Nature surrounds me in my daily life.
4. Animals are present in my day-to-day surroundings.
5. It is important for me to have nature in my daily life.
6. I have hobbies that include nature.
7. Nature is within walking distance from where I live.
8. The places I go every day are near nature.
9. Even when in a car on the freeway, I am aware of the nature around me.
10. My access to nature makes me feel good.
11. Accessing nature is essential to me.
12. I can access nature whenever I choose.
13. Getting to nature requires little effort.
14. It is easy for me to find nature nearby.
15. I feel satisfied with my level of access to nature.
16. I enjoy petting domesticated animals.
17. I touch plants.
18. Physical touch with nature is important to me.
19. There are smells of nature in and around my home.

20. When I walk outside I can smell the plants and trees.
21. I enjoy the smells of nature.
22. I seek opportunities to smell nature.
23. I am happy when I can smell nature.
24. Smells of nature are among life's greatest pleasures.
25. I can see nature from my home.
26. The place I spend most of my time includes a view to nature.
27. I have photos or artwork of nature within eyesight during the day.
28. It is important for me to be able to see nature from my home.
29. It is important for me to be able to see nature from my place of work.
30. I need to see nature each day.
31. I have plants in my home.
32. I like to have plants inside my home.
33. I feel less stress when I see nature.
34. I hear nature throughout the day.
35. When I step outside I hear nature.
36. I listen to recorded sounds of nature.
37. I can hear nature from inside my home.
38. I like to hear sounds of nature.
39. Listening to the sounds of nature is important to me.
40. It calms me to hear sounds of nature.
41. I relax when I hear nature.
42. I seek experiences where I can hear the sounds of nature.
43. I have good memories of being in nature.
44. Nature brings about pleasant thoughts for me.
45. I can recall times I have enjoyed being in nature.
46. The anticipation of being in nature causes me to think good thoughts.
47. Important life events of mine happened while in nature.
48. I have had good times in nature.

49. My relationship with nature makes me feel good.
50. I associate nature with happiness.
51. My experiences in nature make me happy.
52. I feel like I can be myself in nature.
53. I have positive emotions about nature.
54. I feel good about myself when in nature.
55. I am happiest when in nature.
56. I have one or more favorite places in nature.
57. There is a place in nature that brings about feelings of contentment for me.
58. I grew up having at least one favorite place in nature.
59. I feel good about myself when in certain places in nature.
60. I have a favorite spot in nature.
61. Being anywhere in nature makes me feel good.
62. Having a hobby in nature contributes to who I am as a person.
63. I include nature when describing myself to others.
64. My experiences with nature are a big part of who I am.
65. Nature is included in my definition of self.
66. I know where the food I eat comes from.
67. I use renewable energy when I am able.
68. I know how to grow my own food.
69. I feel good about my carbon footprint.
70. I am concerned about climate change.
71. I avoid getting too close to animals that I know could harm me.
72. I know my limits in nature.
73. I keep a distance from forces in nature that could hurt me.
74. I understand when nature can be dangerous.
75. I carry a first aid kit when in nature.
76. I avoid getting too close to plants that I know could harm me.
77. Some things in nature are beyond my understanding.

78. I feel strongly about an environmental cause.
79. Having a positive impact on the health of the planet is important to me.
80. I do my part in preserving nature.
81. If I see litter on the ground I pick it up.
82. I recycle.
83. I am satisfied with my efforts to preserve nature.
84. My beliefs become clearer to me when I am in nature.
85. I feel connected to something bigger than myself when I am in nature.
86. I gain clarity on my life's purpose when I am in nature.
87. Nature makes me feel connected to a larger force in life.
88. I include aspects of nature in my spiritual practice.
89. The stresses in my life seem to go away when I am in nature.
90. Spending time with nature helps me relax.
91. Nature helps me calm down when upset.
92. I go to nature to find peace.
93. My thoughts slow down when I am in nature.
94. I feel at peace with myself when I am in nature.
95. The world's problems go away when I am in nature.
96. I enjoy my spiritual practices in nature.
97. When in nature I feel far away from my usual obligations.
98. I experience a sense of privacy in nature.
99. Being in nature provides me with a sense of being away.
100. My commitments seem to fade away when in nature.
101. My problems go away when in nature.
102. I go to places in nature to get away.
103. I feel a sense of community with others when together in nature.
104. I feel close to others when with them in nature.
105. Experiences with others in nature deepen my relationships with them.
106. I feel connected to all of life when in nature.

107. Exposure to nature brings about unity with all things.
108. When in nature I am more giving to others.
109. I feel compassionate towards others when they are with me in nature.
110. I think about others' needs when in nature.
111. When I am in nature, I find myself thinking about others in my life.

APPENDIX H

PILOT STUDY RECRUITMENT PRESENTATION SCRIPT

You are being asked if want to be in a research study. The purpose of the study you are about to hear about is to explore your perceptions of nature and wellness. We are asking you to be part of the study because you are 18 years of age or older and you are an undergraduate at UNCG enrolled in a public health course. This discussion and the piece of paper given to you will tell you about the study to help you decide if you want to be part of the study. We ask that you take about 20 minutes here today to complete a number of questions we have prepared for you with a pencil and bubble sheet. Most questions ask you to rate your experiences and perceptions of nature and wellness and some ask you to write a few sentences about your evaluation of the assessment. There are no payments made for participating in this study. We hope that this study will allow you to reflect on what makes you feel good about yourself while being in nature. In addition, you will have the opportunity to reflect on how you do or do not connect with your perception of nature and how it impacts your wellness. We hope that this reflection will add meaning to your day and will allow you to further determine what role you would like your conception of nature to play in your life. You may experience minimal psychological or emotional discomfort as you think about your connection with nature. You may refuse to participate or withdraw consent to participate in this study at any time. Your participation is entirely voluntary. Should you feel uncomfortable at any time in this study it is your right to withdraw from the study without penalty or prejudice. In addition, your privacy will be protected as you will not be identified by name as a participant in this study. Data collected here today and results of the questions you are filling out will be linked to a code without identifying information to protect your privacy. Please do not write your name anywhere on the assessments or bubble sheet. All information obtained in this study is strictly confidential unless disclosure is required by law. You should ask any questions you have before making up your mind about whether you would like to participate in the study. You can think about it for a few minutes to decide if you want to be in the study. After you complete the survey you can bring your paper packet to me and you will be done with the study. If you have any questions, thoughts, or concerns please share them now and/or while you complete the assessment. In addition, if you are curious about the results of this study or would like to contact Dr. Myers about any questions you might have, I will provide this information momentarily. After beginning the study, if you decide you do not want to be in the study you may quit filling out the assessment at anytime without penalty or unfair treatment.

APPENDIX I

PILOT STUDY SUPPLEMENTARY FORMS

Pilot Study Supplementary Form 1 of 2

Please respond to the following questions by writing on this sheet.

EcoWellness is defined as the extent to which an individual experiences wellness through their connection with nature.

1. Please circle the number corresponding to your current level of EcoWellness on a scale of 1 to 10. Circling 1 means that your EcoWellness is "the least it could be" and circling 10 means that your EcoWellness is "the most it could be."

The least it could be	1	2	3	4	5	6	7	8	9	10	The most it could be

2. Using the same scale, how important to you is your level of EcoWellness?

Not at all important	1	2	3	4	5	6	7	8	9	10	Very important

3. Out of a typical week, how many hours do you spend with what you consider nature?

_____ hours

Pilot Study Supplementary Form 2 of 2

Please respond to the following questions by writing on this sheet.

1. Do you feel like you fully understood the directions of this assessment? If not, what was confusing to you and how might the directions be improved?

2. How was the layout of the assessment? Was the spacing of the assessment adequate and do you feel like you were easily able to work your way through the assessment? If not, what were some problems you noted?

3. Which items, if any, were worded in a confusing way to you on this assessment? Please state what was confusing about them and write down the number of the item.

4. Were there any items where you did not quite understand what was being asked of you? If so, please mark them down and share what you did not understand about that item.

5. In your opinion, how might this assessment be improved in assessing your connection with nature and how it relates to your wellness? Any and all comments are welcome.

APPENDIX J

PILOT STUDY INFORMED CONSENT FORM

UNIVERSITY OF NORTH CAROLINA AT GREENSBORO
CONSENT TO ACT AS A HUMAN PARTICIPANT: LONG FORM

Project Title: EcoWellness: Construction & Validation of the Reese EcoWellness Inventory

Project Director: Dr. Jane E. Myers

What is the study about?
This is a research project. The purpose of this study is to explore how you feel like your connection with nature impacts wellness. We hope that this study will allow you to reflect on what makes you feel good about yourself while in nature. In addition, you have the opportunity to reflect on how you do or do not connect with your perception of nature and why. You may refuse to participate or withdraw consent to participate in this study at any time. Your participation is entirely voluntary. Should you feel uncomfortable at any time in this study it is your right to withdraw from the study without penalty or prejudice. After you complete the survey you can bring your paper packet to me and you will be done with the study.

Why are you asking me?
We are asking you to participate in this study because you are at least 18 years of age and are an undergraduate student enrolled in a public health course at UNCG.

What will you ask me to do if I agree to be in the study?
We ask that you take about 20 minutes here today to complete a number of questions we have prepared for you with a pencil and bubble sheet. Please use a #2 pencil. After you finish these questions you are done with the study. Most questions ask you to rate your emotions, thoughts, and experiences in nature and others ask for you to write a sentence or two about your evaluation of the assessment. Some questions about nature might cause you to reflect on specific experiences in nature, which may cause some psychological or emotional discomfort. If at anytime you feel uncomfortable in this study it is your right to withdraw from it at any time without penalty or prejudice.

Is there any audio/video recording?
The use of audio/video recording will NOT be utilized for this study.

What are the dangers to me?

The Institutional Review Board at the University of North Carolina at Greensboro has determined that participation in this study poses minimal risk to participants. You may feel uncomfortable at times answering questions about your connection with nature. Should you feel uncomfortable at any time in this study it is your right to withdraw from the study without penalty or prejudice.

In addition, your personal identification will be safeguarded. Data collected here today and results of the questionnaire you fill out will be linked to a code without identifying information. This consent form is for you to keep and you do not need to sign the form. We will not have any materials with your identifying information on it. Should assessment information be breached no information on the assessment will be directly connected to you, the participant.

If you have any concerns about your rights, how you are being treated, concerns or complaints about this project or benefits or risks associated with being in this study please contact the Office of Research Compliance at UNCG toll-free at (855)-251-2351.

Questions, concerns or complaints about this project or benefits or risks associated with being in this study can be answered by Dr. Jane E. Myers who may be contacted at 336-334-3423 or via email at jemyers@uncg.edu.

Are there any benefits to society as a result of me taking part in this research?

Research in this area may provide numerous benefits for professional counselors in their assessment with clients who may or may not benefit from exposure to nature. The results of this study may have implications for integrating the human-nature connection into assessment, practice, and research in counseling.

Are there any benefits to *me* for taking part in this research study?
Participating in this study will allow you to reflect on how the use of nature in your life might or might not lead to wellness. We hope that this reflection will add meaning to your day and will allow you to further determine what role you would like your conception of nature to play in your life.

Will I get paid for being in the study? Will it cost me anything?
There are no costs to you or payments made for participating in this study.

How will you keep my information confidential?
We are not collecting any identifying information from you that will allow anyone to connect your assessment to your name. Results of the assessments will be linked to a participant code without any identifying information in an electronic, password-protected file on the university hard drive. Should assessment information be breached, assessment data cannot be linked to you because we are not collecting your name or any other identifying information. All information obtained in this study is strictly confidential unless disclosure is required by law.

What if I want to leave the study?
You have the right to refuse to participate or to withdraw at any time, without penalty. If you do withdraw, it will not affect you in any way. If you choose to withdraw, you may request that any of your data which has been collected be destroyed unless it is in a de-identifiable state.

What about new information/changes in the study?
If significant new information relating to the study becomes available which may relate to your willingness to continue to participate, this information will be provided to you.

Voluntary Consent by Participant:
Your signature is not required to participate in this study. A waiver of signed consent has been granted by the university IRB. By participating in this study, you are agreeing that you read, or it has been read to you, and you fully understand the contents of this document and are openly willing consent to take part in this study. All of your questions concerning this study have been answered. By participating, you are agreeing that you are 18 years of age or older and are agreeing to participate, or have the individual specified above as a participant participate, in this study described to you by Ryan F. Reese.

APPENDIX K

ORIGINAL AND REVISED REI ITEMS BASED ON PILOT STUDY

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
A_{PAi01}	Plants and trees can be seen on the same street I live on.			X	Item dropped due to high skewness, kurtosis, and low item correlation	
A_{PAi02}	I am attuned to nature wherever I go.		X		Item dropped on account of confusing language	
A_{PAi03}	Nature surrounds me in my daily life.			X	Kept as worded	
A_{PAi04}	Animals are present in my day-to-day surroundings.			X	Item dropped due to multiple interpretations	
A_{PAi08}	It is important for me to have nature in my daily life.		X		Kept as worded	
A_{PAi09}	I have hobbies that include nature.			X	Kept as worded	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
A_{PAi13}	Nature is within walking distance from where I live.	X			Item dropped due to being redundant with other items on scale	
A_{PAi17}	The places I go every day are near nature.			X	Item dropped—redundant with Item A_{PAi03}	
A_{PAi18}	Even when in a car on the freeway, I am aware of the nature around me.	X			Kept as worded	
A_{PAi19}	My access to nature makes me feel good.		X		Kept as worded	
A_{PAi20}	Accessing nature is essential to me.	X			Wording of item adjusted	I need to access nature to feel healthy.
A_{PAii01}	I can access nature whenever I choose.			X	Item dropped on account of confusing wording	
A_{PAii02}	Getting to nature requires little effort.			X	Item dropped as it is redundant with A_{PAii08}	
A_{PAii06}	It is easy for me to find nature nearby.	X			Item dropped on account of confusing wording	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
A_{PAii08}	I feel satisfied with my level of access to nature.		X		Item dropped on account of redundancy.	
A_{SAi01}	I enjoy petting domesticated animals.		X		Item dropped on account of redundancy.	
A_{SAi02}	I touch plants.			X	Kept as worded.	
A_{SAi06}	Physical touch with nature is important to me.	X			Kept as worded	
A_{SAii01}	There are smells of nature in and around my home.			X	Wording of item adjusted	There are smells of trees and plants in and around my home.
A_{SAii03}	When I walk outside I can smell the plants and trees.			X	Item dropped as it is redundant with A_{SAii01}	
A_{SAii07}	I enjoy the smells of nature.		X		Kept as worded	
A_{SAii08}	I seek opportunities to smell nature.			X	Item dropped as it sounded odd.	
A_{SAii09}	I am happy when I can smell nature.		X		Kept as worded.	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
A_{SAii10}	Smells of nature are among life's greatest pleasures.	X			Kept as worded.	
$A_{SAiii01}$	I can see nature from my home.			X	Item dropped since this seems like a common feature of many living spaces.	
$A_{SAiii02}$	The place I spend most of my time includes a view to nature.			X	Kept as worded	
$A_{SAiii07}$	I have photos or artwork of nature within eyesight during the day.			X	Wording of item adjusted	I have photos or pictures of nature within eyesight during the day.
$A_{SAiii08}$	It is important for me to be able to see nature from my home.	X			Kept as worded	
$A_{SAiii09}$	It is important for me to be able to see nature from my place of work.	X			Item dropped as it is redundant with $A_{SAiii10}$	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
$A_{SAiii10}$	I need to see nature each day.		X		Kept as worded	
$A_{SAiii11}$	I have plants in my home.			X	Kept as worded	
$A_{SAiii12}$	I like to have plants inside my home.	X			Item dropped since it was redundant with $A_{SAiii11}$	
$A_{SAiii13}$	I feel less stress when I see nature.		X		Kept as worded	
A_{SAiv01}	I hear nature throughout the day.			X	Item dropped. It seems like one can have high EcoWellness and not hear nature throughout the day	
A_{SAiv02}	When I step outside I hear nature.			X	Kept as worded	
A_{SAiv03}	I listen to recorded sounds of nature.			X	Item dropped as it had low item correlation	
A_{SAiv05}	I can hear nature from inside my home.			X	Item dropped as it seemed confusing to the researcher	
A_{SAiv08}	I like to hear sounds of nature.	X			Kept as worded	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
A_{SAiv09}	Listening to the sounds of nature is important to me.	X			Kept as worded	
A_{SAiv10}	It calms me to hear sounds of nature.		X		Kept as worded	
A_{SAiv11}	I relax when I hear nature.		X		Item dropped as it is redundant with other items in the scale	
A_{SAiv12}	I seek experiences where I can hear the sounds of nature.			X	Item dropped as the behavior described seems uncommon	
EI_{Ci01}	I have good memories of being in nature.	X			Item dropped as it is redundant with EI_{Ci03}	
EI_{Ci02}	Nature brings about pleasant thoughts for me.	X			Kept as worded	
EI_{Ci03}	I can recall times I have enjoyed being in nature.		X		Item dropped as it was redundant with EI_{Ci06}	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
EI_{Ci04}	The anticipation of being in nature causes me to think good thoughts.	X			Wording of item adjusted	The anticipation of being in nature puts me in a good mood.
EI_{Ci05}	Important life events of mine happened while in nature.	X			Kept as worded	
EI_{Ci06}	I have had good times in nature.			X	Wording of item adjusted	The best times in my life occurred while I was with nature.
EI_{Cii01}	My relationship with nature makes me feel good.		X		Kept as worded	
EI_{Cii02}	I associate nature with happiness.		X		Item dropped as it is redundant with EI_{Cii01}	
EI_{Cii03}	My experiences in nature make me happy.		X		Item dropped as it is redundant with EI_{Cii01}	
EI_{Cii04}	I feel like I can be myself in nature.	X			Kept as worded.	
EI_{Cii05}	I have positive emotions about nature.		X		Item dropped as it is redundant with EI_{Cii01}	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
EI_{Cii06}	I feel good about myself when in nature.		X		Item dropped as it is redundant with EI_{Cii07}	
EI_{Cii07}	I am happiest when in nature.		X		Kept as worded	
EI_{Ciii01}	I have one or more favorite places in nature.	X			Kept as worded	
EI_{Ciii03}	There is a place in nature that brings about feelings of contentment for me.		X		Item dropped as it is redundant with EI_{Ciii01}	
EI_{Ciii04}	I grew up having at least one favorite place in nature.			X	Kept as worded.	
EI_{Ciii05}	I feel good about myself when in certain places in nature.		X		Item dropped as it is awkwardly stated	
EI_{Ciii06}	I have a favorite spot in nature.		X		Kept as worded	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
EI_{Ciii09}	Being anywhere in nature makes me feel good.		X		Item dropped as it is redundant with EI_{Cii07}	
EI_{Civ01}	Having a hobby in nature contributes to who I am as a person.	X			Item dropped as it was redundant with EI_{Civ04}	
EI_{Civ04}	I include nature when describing myself to others.			X	Kept as worded	
EI_{Civ05}	My experiences with nature are a big part of who I am.	X			Item deleted as it is potentially confusing to participants.	
EI_{Civ06}	Nature is included in my definition of self.	X			Item dropped as it is redundant with EI_{Civ04}	
EI_{Pti01}	I know where the food I eat comes from.			X	Wording of item adjusted	I understand where my food comes from.
EI_{Pti03}	I use renewable energy when I am able.			X	Kept as worded	
EI_{Pti04}	I know how to grow my own food.	X			Item dropped as it is redundant with EI_{Pti01}	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
EI_{Pti10}	I feel good about my carbon footprint.		X		Kept as worded	
EI_{Pti11}	I am concerned about climate change.		X		Item Dropped—It is uncertain whether endorsement means wellness or not	
EI_{Ptii01}	I avoid getting too close to animals that I know could harm me.			X	Wording of item adjusted	I remain calm when near animals that could harm me.
EI_{Ptii02}	I know my limits in nature.	X			Wording of item adjusted	I am open to trying nature activities that may be discomforting.
EI_{Ptii03}	I keep a distance from forces in nature that could hurt me.			X	Item dropped—High skewness	
EI_{Ptii04}	I understand when nature can be dangerous.	X			Wording of item adjusted	There are aspects of nature that can protect me.
EI_{Ptii05}	I carry a first aid kit when in nature.			X	Item Deleted—not directly related to EcoWellness	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
EI_{Ptii10}	I avoid getting too close to plants that I know could harm me.			X	Wording of item adjusted	I am able to identify plants that can cause me harm.
EI_{Ptii11}	Some things in nature are beyond my understanding.	X			Kept as worded	
EI_{Pv01}	I feel strongly about an environmental cause.		X		Kept as worded	
EI_{Pv03}	Having a positive impact on the health of the planet is important to me.	X			Kept as worded	
EI_{Pv04}	I do my part in preserving nature.			X	Kept as worded.	
EI_{Pv05}	If I see litter on the ground I pick it up.			X	Kept as worded	
EI_{Pv06}	I recycle.			X	Wording of item adjusted	I make it a priority to recycle.
EI_{Pv09}	I am satisfied with my efforts to preserve nature.		X		Kept as worded	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
T_{Si03}	My beliefs become clearer to me when I am in nature.	X			Item dropped as it is redundant with T_{Si05}	
T_{Si04}	I feel connected to something bigger than myself when I am in nature.		X		Kept as worded	
T_{Si05}	I gain clarity on my life's purpose when I am in nature.	X			Kept as worded.	
T_{Si06}	Nature makes me feel connected to a larger force in life.		X		Item dropped as it is redundant with T_{Si04}	
T_{Si09}	I include aspects of nature in my spiritual practice.			X	Item dropped. Statement not necessarily universal	
T_{Sii01}	The stresses in my life seem to go away when I am in nature.		X		Kept as worded	
T_{Sii04}	Spending time with nature helps me relax.			X	Item dropped as it is redundant with T_{Sii01}	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
T_{Sii05}	Nature helps me calm down when upset.		X		Item dropped as it is redundant with T_{Sii01}	
T_{Sii06}	I go to nature to find peace.			X	Kept as worded	
T_{Sii07}	My thoughts slow down when I am in nature.	X			Kept as worded	
T_{Sii08}	I feel at peace with myself when I am in nature.		X		Item dropped as it is redundant with T_{Sii06}	
T_{Sii09}	The world's problems go away when I am in nature.	X			Item dropped as it is redundant with T_{Sii01}	
T_{Sii12}	I enjoy my spiritual practices in nature.		X		Wording of item adjusted	Walking in nature is a spiritual experience for me.
T_{Siii01}	When in nature I feel far away from my usual obligations.	X			Item dropped as it is redundant with T_{Sii01}	
T_{Siii02}	I experience a sense of privacy in nature.		X		Kept as worded	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
T_{Siii05}	Being in nature provides me with a sense of being away.		X		Item dropped as it is redundant with T_{Siii02}	
T_{Siii06}	My commitments seem to fade away when in nature.	X			Item dropped as it is redundant with T_{Sii01}	
T_{Siii09}	My problems go away when in nature.		X		Item dropped as it is redundant with T_{Sii01}	
T_{Siii10}	I go to places in nature to get away.			X	Kept as worded	
T_{CCi01}	I feel a sense of community with others when together in nature.		X		Kept as worded	
T_{CCi02}	I feel close to others when with them in nature.		X		Item dropped as it is redundant with T_{CCi01}	
T_{CCi03}	Experiences with others in nature deepen my relationships with them.			X	Kept as worded	

Item Code	Original Item	Thoughts	Feelings	Behaviors	Researcher Decision	Reworded Item
T_{CCi04}	I feel connected to all of life when in nature.		X		Kept as worded	
T_{CCi05}	Exposure to nature brings about unity with all things.		X		Item dropped as it is redundant with T_{CCi04}	
T_{CCii01}	When in nature I am more giving to others.			X	Kept as worded	
T_{CCii02}	I feel compassionate towards others when they are with me in nature.		X		Kept as worded	
T_{CCii07}	I think about others' needs when in nature.	X			Item dropped as it is redundant with T_{CCii08}	
T_{CCii08}	When I am in nature, I find myself thinking about others in my life.	X			Kept as worded	

APPENDIX L

MARLOW-CROWNE 1(10) SCALE
(Strahan & Gerbasi, 1972)

Directions: Please indicate whether each statement below is true for you or false for you by using your bubble sheet. Please bubble in (A) for "True" and (B) for "False."

1. I'm always willing to admit it when I make a mistake.
2. I always try to practice what I preach.
3. I never resent being asked to return a favor.
4. I have never been irked when people expressed ideas very different from my own.
5. I have never deliberately said something that hurt somebody's feelings.
6. I like to gossip at times.
7. There have been occasions when I took advantage of someone.
8. I sometimes try to get even rather than forgive and forget.
9. At times I have really insisted on having things my own way.
10. There have been occasions when I felt like smashing things.

APPENDIX M

PERMISSION TO USE THE FIVE-FACTOR WELLNESS INVENTORY©

[EMAIL CORRESPONDENCE]

October 3, 2012

Dear Ryan:

Attached please find the permissions form which the authors of the 5F-Wel provide to students wishing to use the instrument in their research. Permission to use the instrument with our assistance is granted provided you agree to all of the terms listed, with the exception of payment for scoring a UNCG students are provided scoring at no charge.

Best wishes,
Jane Myers

Permission to Use the 5F-Wel

The authors of the 5F-Wel will give our permission for your use of the instrument in your dissertation or other research. We will provide information and scoring services, per the following procedures:

1. The Specimen Set for the 5F-Wel includes the Manual, One Instrument, an NCS response sheet if you plan to use paper-and-pencil administration, and a Brief Interpretive Report. The cost for this is $30. The cost is $25 if you will accept pdf files and plan electronic scoring (in which case we will not mail any documents or provide bubble sheets). You can copy the 5F-Wel as needed for your population; the cost of scoring is $1 per person, prepaid. Alternately, you may have your participants complete the inventory online. The scoring cost is the same.

2. You will need to specify the nature of your population. We will then assign you a three digit key code which must be written and bubbled in on all of your forms or included in your electronic data set. This code will comprise the first three numbers for each id, so your cases will be numbered, assuming your code is 99, as 799001, 799002, 799003, etc.

3. As a pilot, please complete one 5F-Wel bubble sheet and mail it to me, or complete an SPSS or Excel file in an agreed-upon format for testing. This is to verify that all instructions are followed and all data requested are provided. We will provide the initial file. You will need to assure that all of your participants provide all of the requested data. (If using the on-line version, filling out the form once is also necessary, with a code to be provided based on the nature of the population).

4. When you have collected all of your data, if you are using bubble sheets, review your bubble
sheets/data form and edit them as necessary for demographic items and missing data. Then, put them all in the same order (one edge of the page is cut so they can be matched, all right side up and facing forward). If you are using on-line administration, you must add “age” as a variable.

5. We will have the data scanned, which takes anywhere from one day to two weeks, depending on when it arrives. We are on a semester system and scanning of midterms and finals takes priority. No scanning services are available during university breaks and holidays. Electronic files may be scored more quickly.

6. The data will be scored using SPSS for windows. Our preference is to e-mail the data file to you. It can also be sent on a disk, but you will have to provide the disk and pay postage. The data file will contain all of the demographic information, item responses, and subscale scores for your participants. It will include raw scores and J-scores for the 5F-Wel factors.

7. We will provide a syntax file to assist you in interpreting the variables in the data set. We will not provide you with the scoring protocol - that is, we will not tell you which items score on which subscales.

8. The manual for the 5F-Wel includes all of the psychometric data you will need for your research proposal.

9. Your data will be included in our data set for development of the 5F-Wel. Individual data will not be used in any form, and we will not conduct research solely on your data set. We expect you to maintain informed consent forms for all participants.

10. Under no circumstances do these permissions include the right to include item and scale
information in published documents resulting from your study. The 5F-Wel is proprietary and any such publication of information is a violation of U.S. copyright laws and professional ethical codes of conduct.

Please let me know if there is anything else we can do to assist you in your research.

Jane Myers

APPENDIX N

INITIAL EMAIL RECRUITMENT REQUEST THROUGH RESEARCHMATCH.ORG

Summary:

- I have been approved by ResearchMatch.org to recruit volunteer participants through their website. I am requesting IRB approval to send the following initial study recruitment message to potential study volunteers through ResearchMatch.org. ResearchMatch asks me to confirm that this language has been IRB approved and that my direct study contact information has been removed (email/phone) before sending my study announcement through ResearchMatch to volunteers that appear to be a good match for my study.

Logistics:

- ResearchMatch provides standard notification language (in grey) that will be received by all ResearchMatch volunteers who may be a match for a given study. My specific message for which I am seeking approval will be inserted accordingly:

A research team with the University of North Carolina at Greensboro, believes you might be good match for the following study:

<researcher's IRB approved study-specific recruitment announcement is inserted here>

If you are interested in this study and having the research team contact you directly, please select the "Yes, I'm interested" link below. By clicking the "Yes, I'm interested" link, your contact information will be released to the research team. If you select the "No, thanks." link or do not respond to this study message, your contact information will not be released to the research team.

QUICK LINK OPTION: YES QUICK LINK OPTION: NO

Thank you for your interest in ResearchMatch.

Message for approval:

- Below is the study-specific announcement that I wish to have inserted into the ResearchMatch notification regarding my study:
- NOTE: Message must not exceed 800 characters.

We invite you to be part of a study in which researchers are exploring connections between nature and wellness. We ask that you take about 20 minutes to complete a number of survey questions that prompt you to rate your emotions, thoughts, and experiences about your level of wellness, and how you feel in regard to your connection with nature. The results of this study may have implications for integrating the human-nature connection into assessment, practice, and research in counseling. Participating in this study will allow you to reflect on how the use of nature in your life might or might not lead to wellness. In appreciation of your time, you will also have the opportunity to be entered into a drawing for one of six $50 Apple gift cards.

Basic information regarding ResearchMatch.org

- ResearchMatch.org is a national electronic, web-based recruitment tool that was created through the Clinical & Translational Science Awards Consortium in 2009 and is maintained at Vanderbilt University. There is no cost for researchers at participating institutions in the ResearchMatch Network to use ResearchMatch for the purposes of conducting recruitment feasibility analysis or participant recruitment. The Vanderbilt IRB provides oversight for ResearchMatch as a recruitment tool and this has been documented within the ResearchMatch IRB Letter of Understanding (available upon request). However, individual requests to use ResearchMatch as a recruitment tool should be submitted to the participating institutions' IRBs (https://www.researchmatch.org/partners/). For more general information regarding ResearchMatch, please visit www.researchmatch.org or contact the Program Manager at info@researchmatch.org

Contacting ResearchMatch Volunteers:

- Once yielding a list of potential matches (ResearchMatch Volunteers), I will send out IRB-approved content that will be the initial recruitment message that these volunteers receive about my study through ResearchMatch [see Figures 1-3]. This study's recruitment content will be inserted into the standard ResearchMatch electronic notification that informs possible matched Volunteers that I, as a researcher, have identified them as a potential match for my study [see Figure 1]. The secure ResearchMatch clearinghouse will route this standard ResearchMatch notification that includes the study content that I enter on "Contacting Volunteers" steps available through ResearchMatch (i.e. similar to the content available on a flyer or poster) to each of these ResearchMatch Volunteers. These potential matching volunteers will have the option of replying yes, no, or not respond through a set of quick links available in this notification to my study announcement. MY CONTACT MESSAGE WILL NOT INCLUDE THIS STUDY'S DIRECT CONTACT INFORMATION (e.g. EMAIL, PHONE) AS RESEARCHMATCH WILL MEASURE THE RESPONSE RATE THROUGH THE CLEARINGHOUSE'S QUICK LINKS MADE

AVAILABLE IN THIS ELECTRONIC MESSAGE. These response rate metrics will be made available to me through my ResearchMatch Researcher dashboard as well as the Institutional Liaison dashboards. By responding yes, the Volunteer has authorized ResearchMatch to release their contact information to me. This contact information of the Yes responding ResearchMatch Volunteers will be made available on my "Managing my Study" dashboard [Figure 4]. I will be responsible for managing this contact information as called for by this IRB-approved study protocol.

Managing my Study in ResearchMatch:

- I can view information regarding my study's status in ResearchMatch (e.g. the expiration date, number of volunteers I have contacted for this study via ResearchMatch to date, response rate of volunteers to my initial recruitment message, etc.) [Figure 4]. ResearchMatch will also be collecting aggregate data regarding the status of ResearchMatch volunteers within my study. ResearchMatch Volunteers consent to this within the ResearchMatch Volunteer Agreement. This information is captured in the ResearchMatch "enrollment continuum" which will allow me to indicate where the Volunteer currently stands within the recruitment process and thus will help me monitor the utility and effectiveness of using this resource (e.g. Did not contact, Not eligible, Enrolled, Completed, etc.) [Figure 4].

I. FIGURES

Figure 1. Contact Volunteers Page (researcher view).

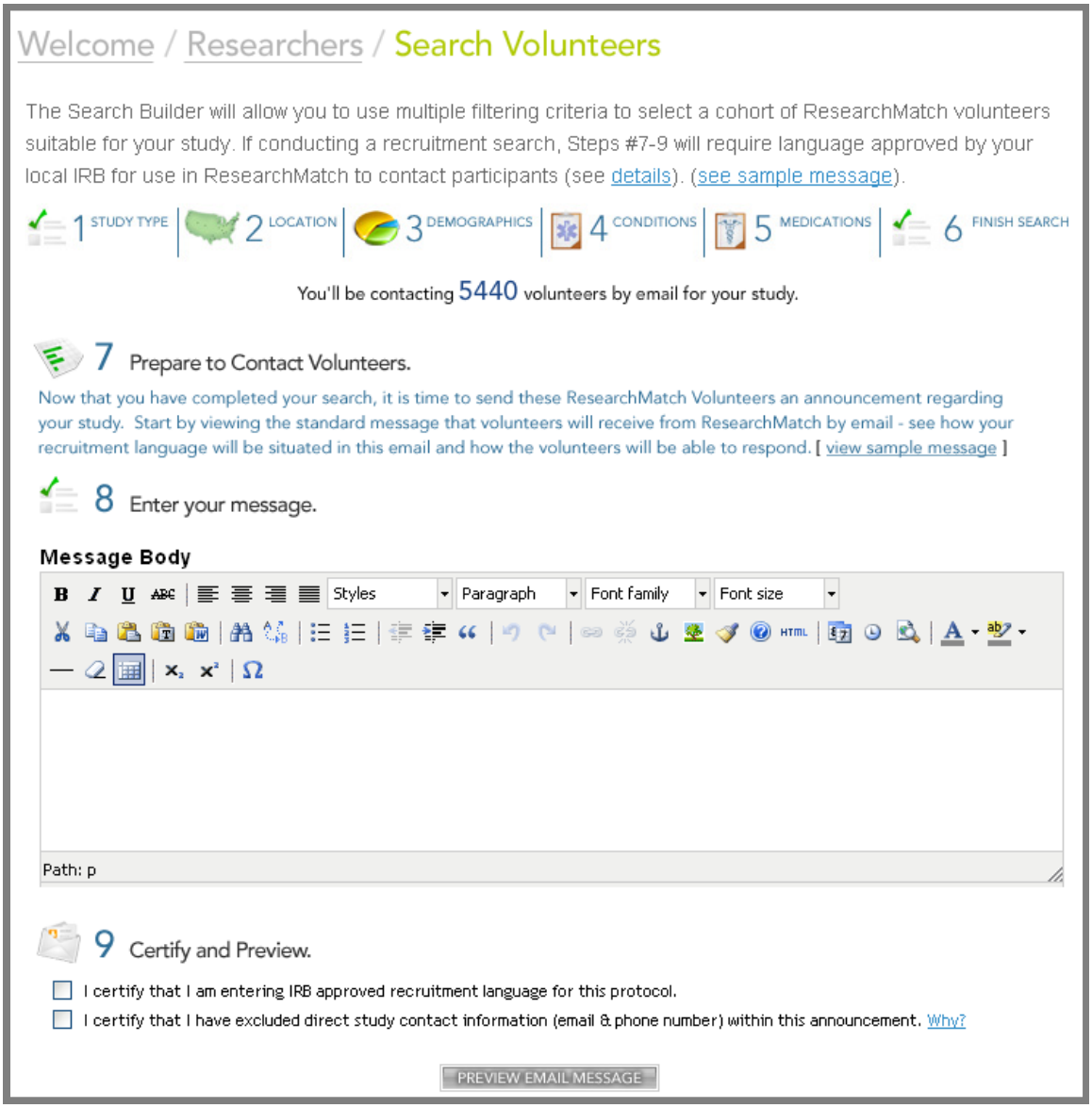


Figure 2. Researcher previews their recruitment message in ResearchMatch format.

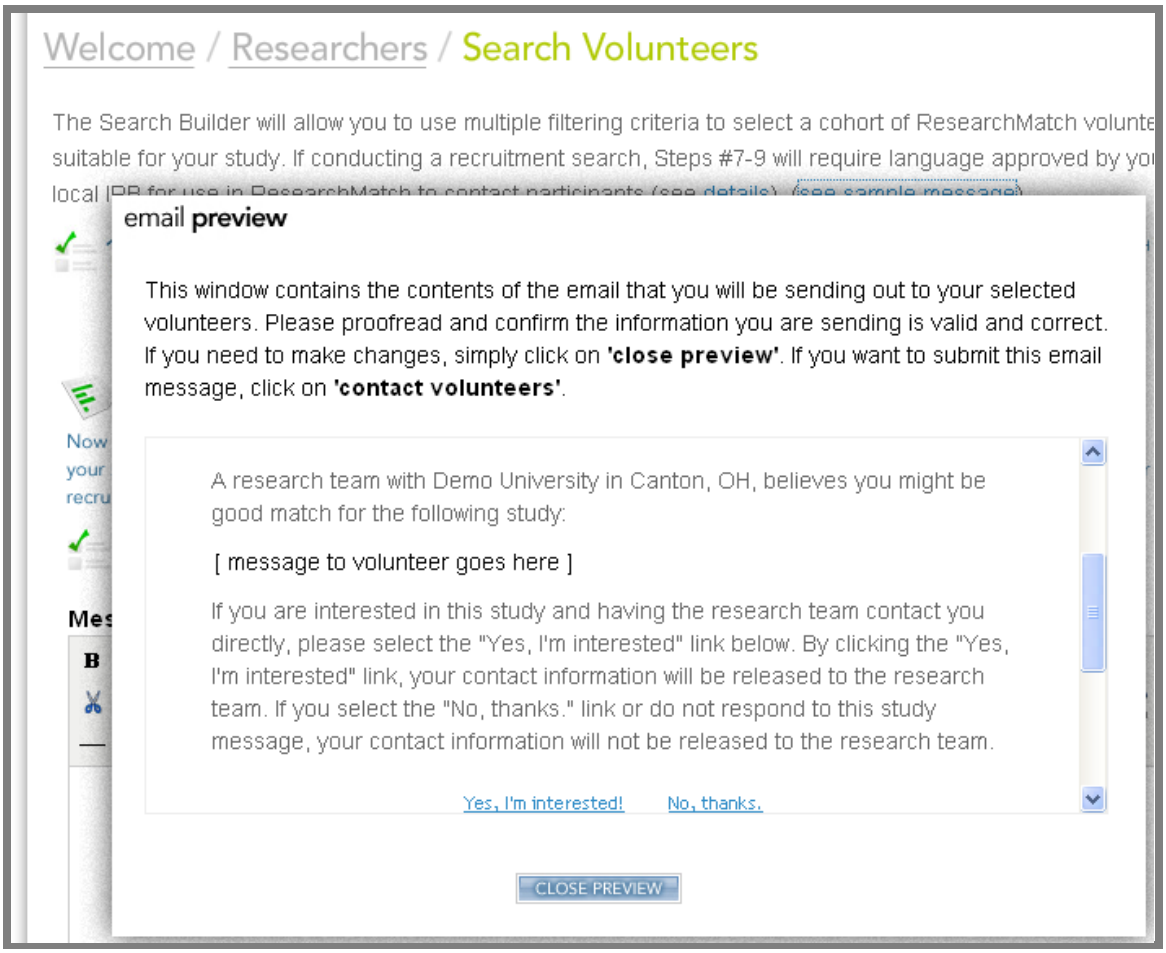


Figure 3. Sample message that ResearchMatch Volunteer receives in email inbox.

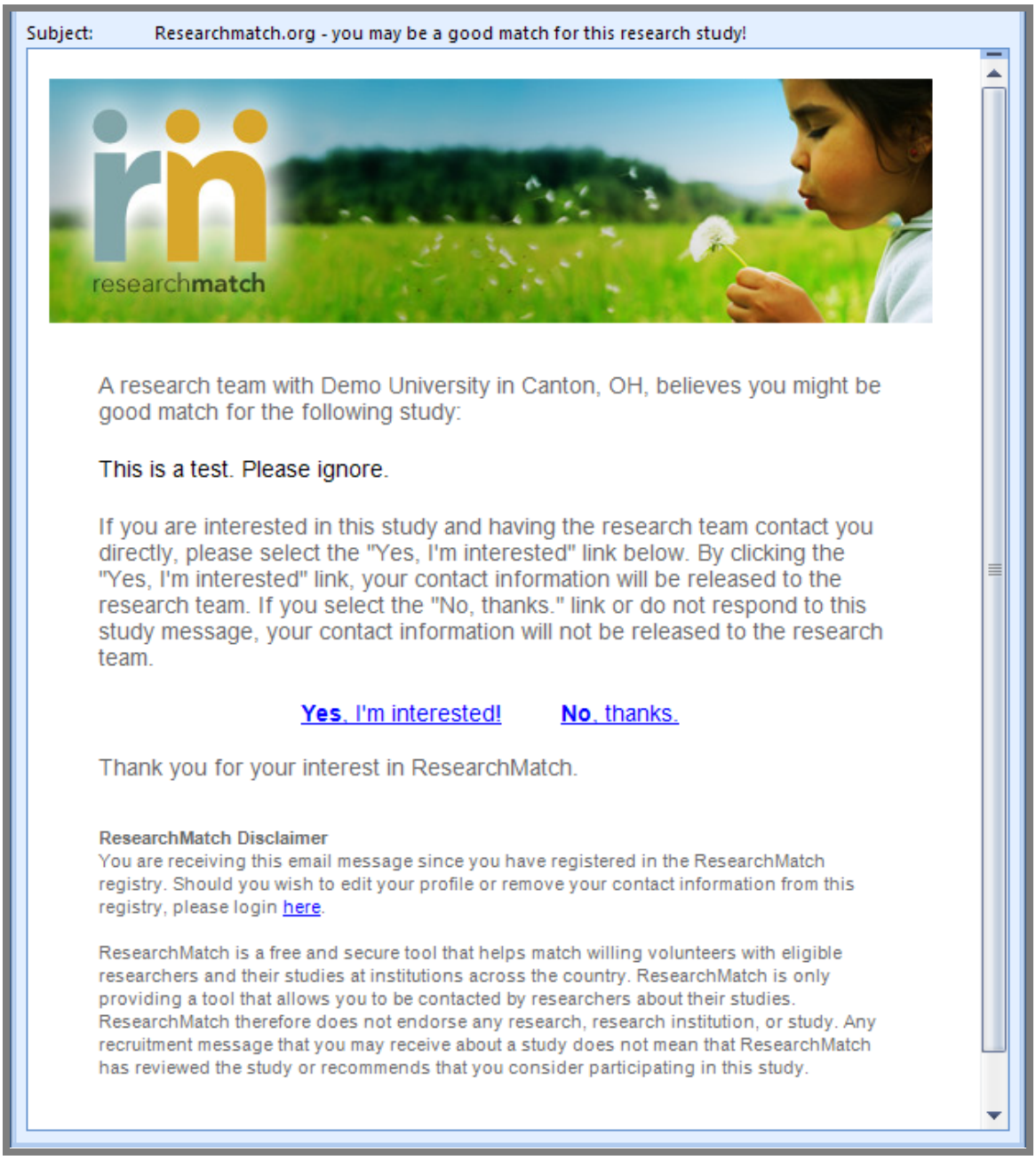
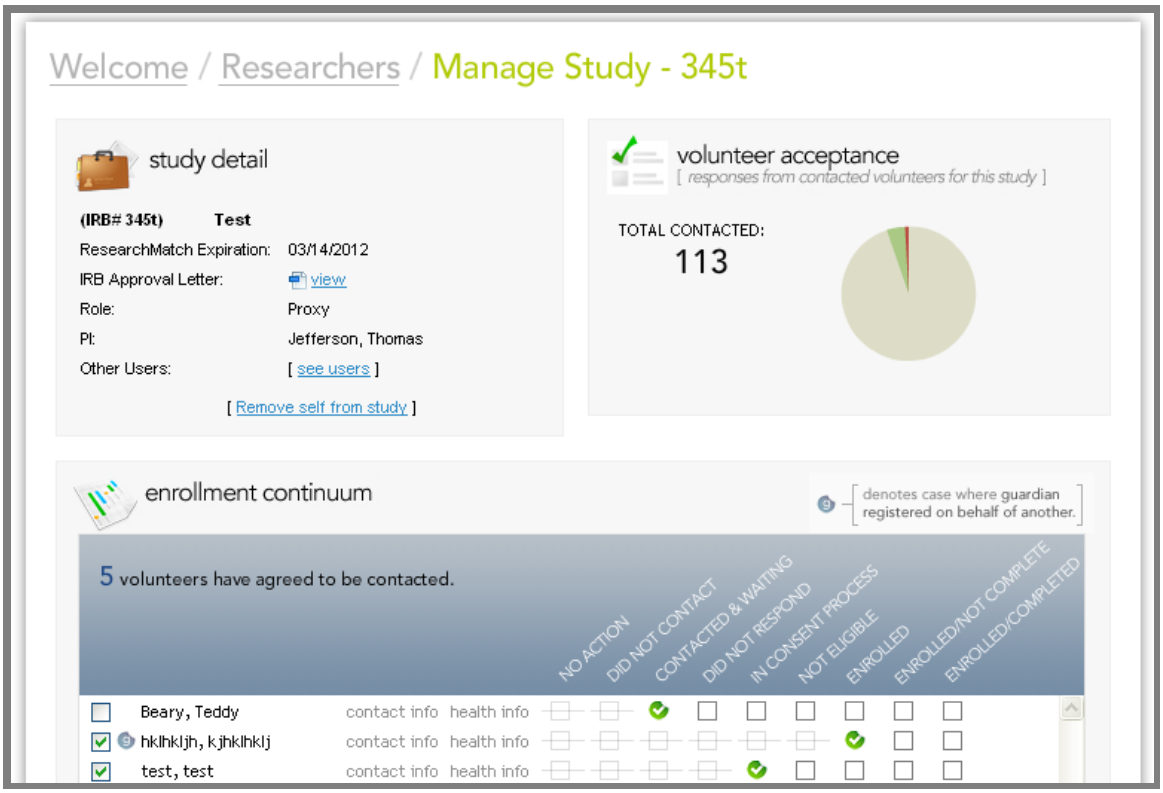


Figure 4. Manage Study Page + Enrollment Continuum.



APPENDIX O

EMAIL RECRUITMENT FOLLOWING RESEARCHMATCH.ORG'S INITIAL EMAIL CONTACT

Potential participants who respond "yes" (that they are interested in being contacted directly by the researchers) in response to the first email inquiry sent by ResearchMatch.org will receive the following blind carbon copied email message directly from the researchers:

Research Study: Nature & Wellness

Dear Potential Research Participant,

Thank you for demonstrating interest in our IRB-approved research study through ResearchMatch.org. We are exploring relationships between nature and wellness and invite you to take approximately 20 minutes to complete questions about your perceived wellness, and how you feel in regard to your connection with nature. Doing so may have implications for counselors wishing to integrate nature into clinical practice and research. We also hope that your participation in this study provides you with an opportunity to reflect on how the use of nature in your life might or might not impact your wellness.

You must be at least 18 years of age to participate in this study.

If you would like to complete this research study please click the link below to participate.

[**http://tinyurl.com/EcoWell**]

As compensation, you will have the opportunity to be entered into a drawing for one of six $50 gift cards to Apple.

For more information about this research study please email Dr. Jane E. Myers, Professor of Counselor Education, at the University of North Carolina at Greensboro at jemyers@uncg.edu

Sincerely,

Jane E. Myers, Ph.D., NCC, NCGC, LPC
Professor
University of North Carolina at Greensboro
1109 Spring Garden Street
Greensboro, NC 27402-6171
http://www.uncg.edu/ced/jemyers/

One-Week Follow-Up Reminder Email

Research Study: Nature & Wellness

Dear Potential Research Participant,

About a week ago you were sent an email inviting you to participate in an IRB-approved research study about nature and wellness through ResearchMatch.org. If you have already completed this assessment, thank you. If you have not already completed the assessment and are still interested, we invite you take about 20 minutes to complete the survey.

We are exploring relationships between nature and wellness and invite you to complete questions about your perceived wellness, and how you feel in regard to your connection with nature. Doing so may have implications for counselors wishing to integrate nature into clinical practice and research. We also hope that your participation in this study provides you with an opportunity to reflect on how the use of nature in your life might or might not impact your wellness.

You must be at least 18 years of age to participate in this study.

If you would like to complete this research study please click the link below to participate.

[**http://tinyurl.com/EcoWell**]

As compensation, you will have the opportunity to be entered into a drawing for one of six $50 gift cards to Apple.

For more information about this research study please email Dr. Jane E. Myers, Professor of Counselor Education, at the University of North Carolina at Greensboro at jemyers@uncg.edu

Sincerely,

Jane E. Myers, Ph.D., NCC, NCGC, LPC
Professor
University of North Carolina at Greensboro
1109 Spring Garden Street
Greensboro, NC 27402-6171
http://www.uncg.edu/ced/jemyers/

Final Follow-Up Reminder Email

Research Study: Nature & Wellness

Dear Potential Research Participant,

This is a final email request you will receive inviting you to participate in an IRB-approved research study about nature and wellness through ResearchMatch.org. If you have already completed this assessment, thank you. If you have not already completed the assessment and have an interest, we invite you take about 20 minutes to complete the survey. We ask that you complete this assessment by ***November 21, 2012***.

We are exploring relationships between nature and wellness and invite you to complete questions about your perceived wellness, and how you feel in regard to your connection with nature. Doing so may have implications for counselors wishing to integrate nature into clinical practice and research. We also hope that your participation in this study provides you with an opportunity to reflect on how the use of nature in your life might or might not impact your wellness.

You must be at least 18 years of age to participate in this study.

If you would like to complete this research study please click the link below to participate.

[**http://tinyurl.com/EcoWell**]

As compensation, you will have the opportunity to be entered into a drawing for one of six $50 gift cards to Apple.

For more information about this research study please email Dr. Jane E. Myers, Professor of Counselor Education, at the University of North Carolina at Greensboro at jemyers@uncg.edu

Sincerely,

Jane E. Myers, Ph.D., NCC, NCGC, LPC
Professor
University of North Carolina at Greensboro
1109 Spring Garden Street
Greensboro, NC 27402-6171
http://www.uncg.edu/ced/jemyers/

APPENDIX P

EMPIRICALLY-DERIVED REI FACTORS AND CONSTRUCT DEFINITIONS

Higher Order Factor

EcoWellness: a sense of appreciation, respect for, and awe of nature that results in feelings of connectedness with the natural environment and the enhancement of holistic wellness

Lower Level Factors (1-7)

Factor 1: *Physical Access (PA): Having physical access to nature*

i. Living, working, socializing, or recreating in, near, or with places or species that the individual considers nature
ii. The ability to physically access nature at one's discretion

Factor 2: *Sensory Access (SA): Being close to nature through one's senses, even in the absence of physical access to nature.*

i. Being able to touch nature
ii. Being able to smell nature
iii. Being able to see nature
iv. Being able to hear nature

Factor 3: *Connection (C)*

i. Experiencing pleasant cognitions (including memories) while reflecting on one's relationship with nature
ii. Having positive emotions while reflecting on one's association with nature
iii. Having a special place (or places) in nature that elicit(s) positive emotions and cognitions
iv. Having at least one activity in or with nature that one incorporates into a self-definition

Factor 4: *Protection (Pt)*

i. Incorporating elements of nature into one's lifestyle that can be of benefit to one's survival
ii. Taking precautions that would promote one's survival when in the presence of or near species or natural elements that can bring harm to the individual.

Factor 5: *Preservation (Pv)*

i. Taking action(s) related to an environmental cause

***Factor 6**: Spirituality (S)*

i. A perceived connection with one's conception of a higher power or life-guiding beliefs when in the presence of nature
ii. The ability to find inner peace when in the presence of nature
iii. A sense of seclusion and being away from one's typical environment

***Factor 7**: Community connectedness*

i. A greater sense of interconnectedness with the human and non-human community through contact with nature
ii. Compassionate and generous acts toward others when exposed to nature